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JOURNAL OF FORESTRY

VOL. XXXII NOVEMBER, 1934 No. 8

EDITORIAL

THE SHELTERBELT TREE PLANTING PROJECT

THE announcement of the great shelter belt project last July and the accompanying publicity has caused a widespread feeling of uneasiness and apprehension, and even active protest among members of the Society of American Foresters. Foresters have been and still are regarded by many engineers and scientists as falling short of professional status. This attitude has been due largely to many unscientific statements regarding the effect of forests upon climate and rainfall, most of which came from sources other than that of the forestry profession. The extreme popularity of these beliefs and the need for support for public forestry programs has made the task of bringing the field of forest influences down from the clouds to the earth an uphill task.

Just as real progress has perhaps for the first time been recorded in convincing other professions of the soundness and technical honesty of our findings in the field of erosion control and forest or brush cover, there comes this sudden front page publicity, reviving all the old misguided notions of forests and climate. Thinking foresters cannot but regret the form that this has taken or the interpretations placed by the public upon such official statements as "man can ameliorate the effects of weather on a large scale, just as he can around his home."

These thoughts are concisely expressed by a former president of the Society, Walter Mulford, as follows:

"I wish to place on record the *grave misgivings* of at least one forester as to President Roosevelt's shelter belt project. It is my belief that the plantations have small chance of real success; even if they do succeed, the beneficial results will probably be so small as to be of little relative moment; even if the effects of the shelter belt are as helpful as is hoped by the most enthusiastic supporters of the project, the benefits cannot be anything like as great as would result if the same huge sum were spent on far more assured forestry projects in other portions of the country; the obvious necessity of the moment for supplying local part-time employment to local people could better be worked out with some more promising undertaking; the whole enterprise, prominent as it is in the public mind, bids fair to prove a boomerang

which will give forestry a terrific setback in public opinion."

The Forest Service points out that by "drought relief" was meant, not the banishment of physical droughts but the distribution of federal funds in the drought stricken districts, for which this project is a vehicle. This raises the whole question of the economic policy involved in spending money on federal projects, primarily for purposes of relief, but which in themselves may not be sound technically or give promise of self-liquidating returns or social benefits equivalent to the costs. If these expenditures are placed squarely on the basis of a public aid to bankrupt settlers it is quite a different matter from justifying them as an economic measure approved by the profession of forestry.

As outlined in its rigid simplicity, of 100 continuous belts of trees 1,000 miles long, the plan is fantastically impossible. This is a region where trees do not grow naturally except under "hothouse" conditions, that is, where local conditions supply water in excess of the natural rainfall. Hence, the region is submarginal for forest plantations as such, and any trees produced there will require initial thorough soil preparation, continuous cultivation for several years, and fencing for protection not only from cattle but from rabbits. On heavy clay soils, or on alkaline areas no success can be expected even with the utmost care. Where the soil permits of tree growth the rate of height growth is slow and the trees are relatively shortlived. Unusual droughts like those of 1934 cause the death of most of these plantations.

Yet trees can be grown on these plains, provided the entire operation is guided from first to last by the highest technical skill in selecting site, species, seed sources, planting methods, cultivation and continuous care, rejecting all chances on which the odds are unfavorable, and disregarding the relatively very high costs of the operation. Not only that, but the localities which produce these trees are made better places for human beings to live in. The *immediate* lee of a windbreak is given distinctly beneficial protection from the velocities and evaporation of strong hot winds, or stinging northers. *Frequent* hedges and tree belts (every few hundred feet) are used with good effects in forest nurseries and elsewhere to control blowing sands.

The combined advantages of greater comfort and attractiveness has encouraged repeated efforts at tree planting for shelter around farmsteads; and even as windbreaks for field crops, much planting has occurred. The effects of all such planting are confined to the one factor of lessening the velocity of winds.

It is conceded that no effect from this source is felt beyond a distance of from 10 to 15 times the height of the trees or for 50-foot breaks, from 500 to 750 feet. Mr. Ellsworth Huntington, whose article appears in this issue, discusses the economic insignificance of such benefits compared to their cost. Upon average rainfall, the general force of the continental winds, or the recurrence and severity of droughts, *foresters as a whole will concede no effect whatever*, and must emphatically refuse to be placed in a false position by loose statements in the public press.

In order to secure the real benefits of windbreaks when and where they can be made to grow, the choice is offered between the Canadian system under which an average of eight million trees have been distributed annually from government nurseries to self respecting farmers situated upon land capable of continuous agriculture, for the purpose of creating such windbreaks, under their own care and management, and the proposed system in the Great Plains under which the federal government will create

out of public funds a colossal network of publicly owned stringers of land on which plantations are to be established requiring exclusion of farm and range stock (and rodents) by publicly constructed and maintained fences, the whole scattered over an area of 100,000 square miles, or over one-third the total area of the national forests, on not a mile of which would the government be free from administrative responsibility, unless, of course, the future of these public plantations is to be abandoned to the rabbit, the range cow, the drought and local trespass for fuel and fence posts.

Faced with the huge technical problems involved, the addition of this administrative burden puts a well nigh impossible strain on this project. If to this is added the announced and enforced policy of the administration to require political endorsement for all non-technical supervisory positions, the wisdom of devoting this huge sum to submarginal forest planting on the Great Plains may well be questioned in spite of the conceded statements of some experts that trees with proper care can be made to grow in this belt.

In national economy, those nations like the Dutch, which count the cost of huge economic improvements such as the draining of the Zuider Zee, and balance these costs against public benefits before expending money on technical operations, must eventually have the advantage over others which permit of the unparalleled waste of resources without sane and thorough analysis of ultimate as well as immediate effects of conservation measures. A national forest policy based on the best technical thought was presented in the recent Copeland Report. The sum intended for "drought relief" would go far towards establishing the sound measures advocated in this report. American foresters are ready to echo the recently expressed sentiments of European experts that "with the magnificent opportunities in America for practical advances in forest conservation, what a pity that such a sum be not spent for more substantial and more promising conservation projects applied to existing forests."

H. H. CHAPMAN.

MARGINAL LAND AND THE SHELTER BELT

By ELLSWORTH HUNTINGTON

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Professor Huntington first gave public expression to his appraisal of the Shelter Belt Project at the recent annual meeting of the Society for the Protection of New Hampshire Forests at Plymouth, N. H., on September 6-7, 1934. His remarks, coming from a recognized authority on economic geography made a profound impression on his audience, including a number of professional foresters, and created a demand to see them in print. It is in response to that demand that the following article is offered to the JOURNAL's readers. It is understood that a prominent member of the Shelter Belt Project staff has in course of preparation an exposition of the project from the standpoint of those officially connected with it. It is to be hoped that his copy will come in in time for the December JOURNAL. It is to be regretted that it was not available for this November number.

THE Administration at Washington has adopted two policies in respect to the semi-arid lands of the states from North Dakota to Texas. According to one the driest farm lands in the western parts of these states are to be bought by the government, thus enabling the farmers to move away from a region where frequent crop failures render the American standard of living impossible. According to the other the farmers of the central parts of these states, where it is not quite so dry, are to be enabled to raise good crops and maintain the American standard by means of a shelter belt of trees. The ultimate aim of both policies is to preserve the American standard of living, but while the first seems well adapted to this end, the second way in the long run aggrevate the very evils that it is intended to correct.

The desirability of permanently removing the crop-raising farmers from the drier parts of our present agricultural lands is illustrated in western Kansas. Cycles of climate are the rule there, as everywhere. Drought and famine drove away some of the first settlers as early as 1860. That year the rainfall was negligible until June. Even in eastern Kansas, at Manhattan, the total from October, 1859, to September, 1860, was only 1[illegible] inches, or less than half the normal. In the early 70's the same thing occurred again on a larger scale. Many new farmers who had moved in since 1866 left their farms and returned to moister regions. The discontent of the remainder led to the political movement known as the Patrons of Industry, which in more prosperous times grew into the Grange and the Farmers Alliance. When the rainfall again became propitious in the later 70's and the 80's new farmers occupied western Kansas in greater numbers than ever. In the early 90's, however, droughts again caused a multitude of farms to be abandoned. During the year from November, 1893, to October 1894, the rainfall at Hays in western Kansas, where a weather bureau station had by this time been established, amounted to only 11 inches in comparison with an annual average of 23, and the next year was almost equally dry. The distress of this period was one of the primary reasons for the political party known as the Populists. With the normal perversity of human beings the farmers blamed the government at Washington for troubles due to nature. Many who had been driven from their home-

by drought returned to the more rainy East. Some of their great covered wagons bore big placards saying: "I'm going back to my relations. Damn Cleveland's administration."

When Cleveland and the dry, wicked Democrats ceased to oppress the land, the rains once more became favorable. McKinley boosted the rainfall fifty per cent above the normal in 1898, and the fortunate first Roosevelt raised it still higher in both 1902 and 1903. Since mankind is extremely optimistic and the pressure of population is great even in America, farmers again flocked to western Kansas. But in 1910 and 1911 a rainfall only half as great as eight years previously led to another mild exodus from this marginal section. Now, after the great Democratic drought of 1933 and 1934 we have a still greater repetition of the same story. Such droughts, together with locusts and other misfortunes, prevents the crops of western Kansas from affording a satisfactory living. The farmers incur debts in dry years and cannot pay them during good years. To put the matter bluntly, much of the Shelter Belt area and most of the land immediately west of it is sub-marginal from the standpoint of permanent crop-raising. Ordinary small farmers can live there only if they accept a standard of living lower then that which prevails farther east. Such conditions seem to justify the government's policy of buying the submarginal farms.

This by no means indicates that the western half of the states from North Dakota to the Panhandle is worthless. On the contrary, it is good cattle country, for nutritious grasses grow there admirably. An expenditure of less than the $75,000,000 proposed for the Shelter Belt would provide almost complete protection for cattle against drought. In thus converting abandoned crop land into good cattle country the first requisite is deep wells, pumps, and pipes, so that abundant water may be easily available. The second requisite is some coöperative scheme, financed perhaps by the government, by which wild hay, cut on fields especially enclosed for the purpose, may be stored for use in years of drought. A third requisite, if American standards are to persist, is that the cattle-raisers live in villages and drive out to their work instead of letting their families live in isolation. Under such an arrangement the population would be less dense than now, but far more prosperous. This would enable the industrial cities farther east to support more people than at present. A thousand families with a hundred dollars apiece to spend each year, over and above their food, provide only $100,000 worth of business for other people. Four hundred families on the same land might easily have $750 apiece to spend, and thus provide $300,000 worth of business. Such a difference may be expected when the marginal grasslands are scientifically used for cattle rather than for crops to which they are not well adapted. Bear in mind that on an average over long periods the whole region that we are discussing produces no more than 10 bushels of wheat per acre, whereas Belgium produces four times as much.

In the better part of the semi-arid, submarginal region the Shelter Belt plan proposes to maintain American standards by planting trees instead of by moving the farmers. In a strip 100 miles wide from North Dakota through South Dakota, Nebraska, and Kansas to part of Oklahoma and the panhandle of Texas, it is proposed to plant 100 parallel windbreaks approximately 120 feet wide, a mile apart, and more than 1,000 miles long. The scientific basis for this is that trees protect crops from the dissicating southwest winds which are one of the great sources of damage. There-

fore, the government assumes that 120 belts of trees would insure good crops in this marginal strip.

The Shelter Belt plan faces three main questions: (1) If such a belt were possible, would it insure reasonably good crops; (2) Would the results justify the expense; and (3) What evidence is there that such a belt is possible? A sufficiently extensive stand of trees undoubtedly protects crops from damage by dry, hot winds. But how far from the trees does this protection extend? Consult your own experience. How much are you protected from the wind when you stand in an open, level field a quarter of a mile to leeward of a forest? Not much, according to the experience of most of us.

R. S. Kellogg in the New York *Times* for September 16, 1934, quotes experiments by F. H. King to determine the evaporation at various distances from an oak grove. Twenty feet from the edge of the grove the evaporation was only 66 per cent as great as in the open fields far from the trees, but 300 feet from the trees no effect could be detected. Other measurements may give somewhat different results, but normally the effect of trees at a distance of over 1,000 feet must be slight. Moreover, experience in well-wooded regions affords little evidence that the effect of a succession of tree belts a mile apart would be cumulative so that the eastern side of the belt would be relatively free from wind. According to the plan of the Administration each strip a mile wide and a thousand miles long is to have 120 feet of trees and 5,160 feet of open country. But King's tests suggest that even if there were ten strips of trees in every mile they would not be fully effective. For the sake of argument, however, let us assume that 10 strips of trees are planted per mile, and that the trees protect one another sufficiently so that the strips need be only 60 feet wide.

Under such circumstances how much effect upon the crops could we expect? Even in the immediate lee of the trees the yield per acre could scarcely equal that of Illinois where there are plenty of windbreaks and the rainfall is far more abundant and regular than in the Shelter Belt. In Illinois the yield of wheat over a twenty-year period averages 16 bushels per acre, so that 14 bushels in the immediate lee of the trees in the Shelter Belt would be liberal. But King's data and ordinary observation indicate that east of each strip of trees the protective effect would diminish rapidly, and would be negligible on the east side of each open space 500 feet to leeward of the trees. Hence there the yield would be the same as now, about 10 bushels. Thus the average for each open strip would be 12 bushels, or an increase of two bushels per acre. This estimate, of course, is a mere guess, which probably errs on the side of liberality. It is introduced merely to illustrate the order of magnitude of the results that might optimistically be expected.

The preceding estimate affords some idea of the financial aspects of the Shelter Belt. The Forest Service estimates that when allowance is made for topography, soil, and so forth, the area immediately affected by the present plan amounts to 20,000,000 acres of which 1,820,000 would be in trees. Let us assume that an extra two bushels could be secured each year from every one of the acres not devoted to trees, which is far beyond any reasonable probability. If this could happen with the strips a mile apart as now planned by the government, and if the cost could be limited to $75,000,000, both of which seem to be out of the question, the Shelter Belt would produce 36,360,000 bushels more wheat than at present in return for an interest charge of $3,750,000, reckoning at 5 per cent. Since this is about 10 cents a bushel, or only 6 cents if we reckon the interest at 3 per cent, it would be worth while

But suppose, first, that 10 narrower strips are needed; second, that the crops are thereby increased appreciably only half the time, that is, in years of hot droughts; and third, that the final cost per acre of trees runs 50 per cent above the original estimates, as is usually the case in such projects. Then the cost of planting the trees would be $762,500,000, and the increased yield would average only one bushel per acre. Hence, even if the same amount of land could be cultivated, which would not actually be the case, each bushel of wheat added by the Shelter Belt would cost about $2.10 for interest alone on a 5 per cent basis, and $1.40 at 3 per cent. If these figures are anywhere near correct the Shelter Belt project is far too expensive to be even considered.

The reader will doubtless say that when estimates vary all the way from six cents to $2.10 per bushel they are not worth much. That is perfectly true. Neither our estimates nor those of the government justify the adoption of any pronounced opinion either for or against the Shelter Belt. One of the curious features of the whole project is the apparent lack of careful statistical analysis. The necessary facts could easily be gathered. Before anything further is done an impartial commission ought to investigate the effect of windbreaks on the crops of 1934 and earlier years in the region east of the proposed Shelter Belt, including good years as well as bad. So far as I have been able to ascertain, the windbreaks made no appreciable difference in the crops of 1934, but this is by no means certain. The whole matter ought to be most carefully investigated.

Certain other theoretical considerations have a bearing on the probable value of the Shelter Belt. In the first place, meteorologists are practically unanimous in believing that any effect which a tree belt might have upon the rainfall would be negligible. In the second place, the shelter afforded by trees is useful mainly in hot weather when well-grown crops are in danger of being wilted by dry winds at the critical stage when the grain is swelling. But such winds are by no means the only cause of crop failures. Many failures are due to a cause which the trees do not influence, namely, scarcity of rain during the earlier stages of growth while the weather is still comparatively cool. This is especially true of winter wheat, which is far more important than corn or spring wheat in the Shelter Belt as a whole.

The rainfall data at Hays in central Kansas, near the heart of a great winter wheat area and on the more favorable eastern edge of the Shelter Belt, illustrate the unreliability of the rainfall during the cooler season before the arrival of the scorching southwest winds. The rainfall at Hays averages 23 inches, but only the 13 inches which fall during the eight months from October to May are of much importance for winter wheat. This crop is planted in the autumn and harvesting begins in June. The most important period, March, April and May, has a normal rainfall of 6.7 inches, but to insure a really good crop 9.0 inches are needed. Nevertheless, of the 67 years from 1868 to 1934, eleven had less than 3.5 inches during these three months. Three of these occurred in succession (1893-5) and 1934 had only 2.4 and 1922 only 1.5 inches for the three months.

Great damage likewise arises from a deficiency of autumn rainfall. The normal for September, October, and November at Hays is 4.6 inches, but during 12 of the 67 years of record the amount was less than half of this and in 2 cases one inch or less. When the rainfall is so deficient during the two most critical periods, the shelter of trees at a later stage can do little to restore the crops. Under such circumstances the dryness of the ground in autumn and spring prevents the crops from growing properly

even in the vicinity of the trees. Thus, even if a tree belt could be established, it would be of little value in two kinds of bad seasons, namely, those experiencing droughts in the cooler months when the wheat is germinating and making its early growth, and the deadly years when rain is deficient during the spring before the arrival of great heat. Corn profits from the shelter of trees more than does wheat, because its main growing period is in hot weather, but corn is far less important than wheat in the Shelter Belt. The net result, then, is that even if a Shelter Belt were established its effect would be important chiefly in years when the precipitation of the cooler season insures a good early growth of the crops before hot weather sets in.

We are now ready for the question of whether trees will grow successfully in the proposed Shelter Belt. They certainly do not grow there today. Where there are no streams no trees can be seen for miles in many cases. This is true in spite of hundreds of attempts to grow them. There is no doubt, however, that trees will grow near rivers and in other unusually damp places. Nor is there any doubt that if trees are watered during their early years they may live a long time. Such watering, however, appears to be no part of the present plan, for it would involve an expense enormously exceeding the $75,000,000 now contemplated. If benefit to the country's forestry program is desired, the Shelter Belt is almost the worst possible place to choose. The most that can be expected, even with the greatest care in choice of trees, is a slow growth and an extravagant percentage of deaths among the trees. The place to spend money in promoting forestry projects is the place where trees grow best so that nature may do most of the work and bear most of the expense.

If the young trees are not watered, their success depends entirely upon chance, or rather upon the phase of a climatic cycle in which they happen to be set out. Formerly the U. S. Weather Bureau considered that records "covering not less than 20 years . . . . are sufficient to cover all extremes of climatic changes that are liable to occur," as is stated in the Climatological Summary for western North Dakota, for example. This claim is no longer made. On the contrary, meteorologists now recognize that the longer the weather record the greater the extremes which it is likely to show. Moreover, there is abundant evidence of long cycles of climate lasting scores of hundreds of years. Their course during recent decades is illustrated in the accompanying diagrams. The dotted lines on the right represent places on the eastern edge of the proposed Shelter Belt or somewhat east of it, the exact location depending on where long records are available. Each point on a line represents the average rainfall during the twenty years ending with the date indicated. Thus at Pembina, North Dakota, the rainfall during the 20 years ending in 1897 averaged more than 22 inches, but has now declined so that during the period ending in 1933 it averaged only 17.5. Minden, Nebraska, shows a similar decline from 33 inches for the twenty years ending in 1898 to 23.5 inches in the twenty ending in 1926 but since then there has been a slight recovery. Omaha shows a similar situation, with a drop from 33 to 25 inches. In Kansas the combined records of Leavenworth and Manhattan show a 22 per cent increase in rainfall over a period of more than 60 years, but since the twenty years ending in 1917 there has been a decrease. Farther south in western Oklahoma an opposite condition prevails. Tulsa shows a fairly regular increase from 35 inches for the two decades ending in 1908 to 41.5 for the period ending in 1933.

The corresponding conditions within

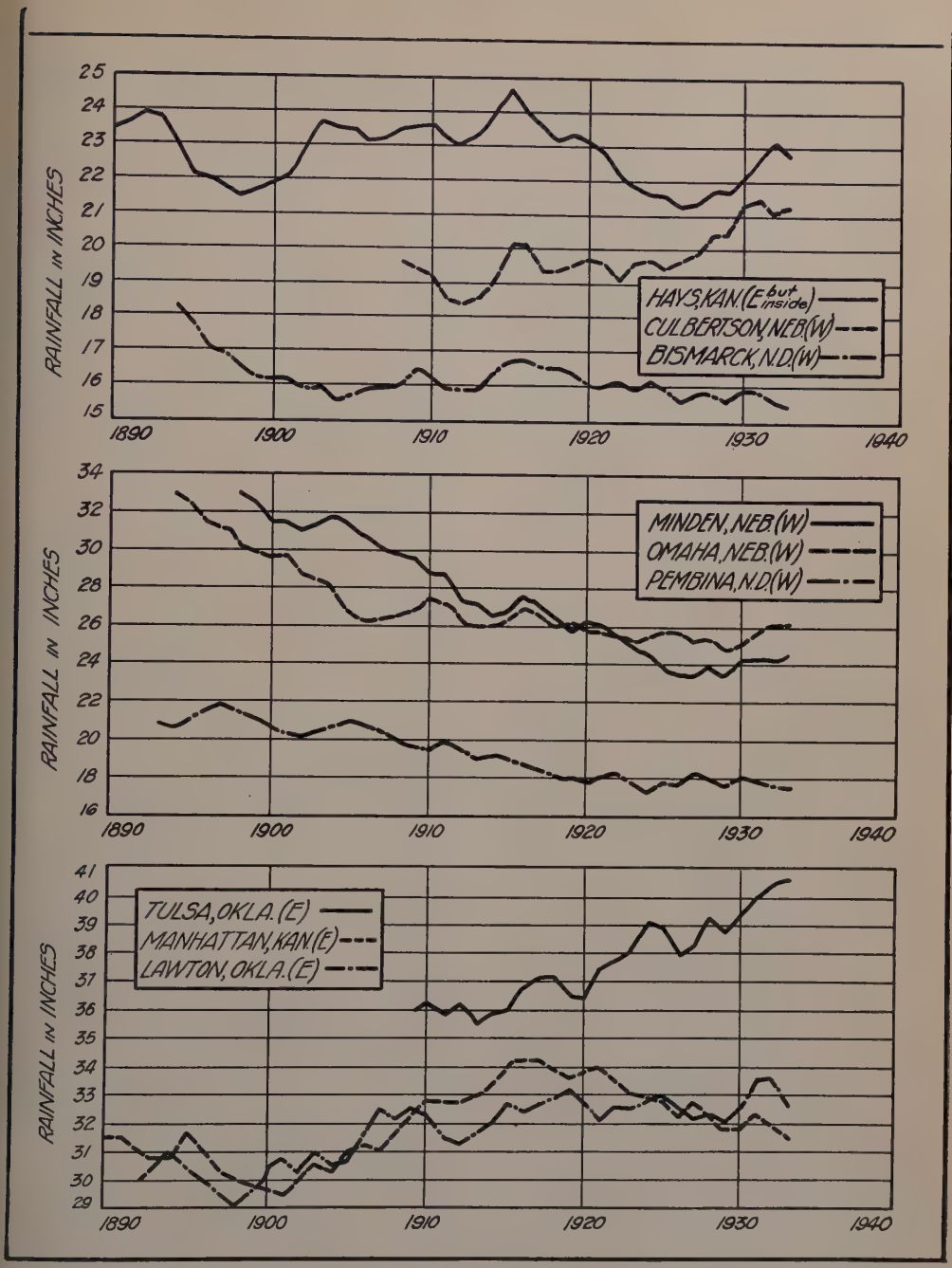

Fig. 1.—Twenty-year moving averages of annual rainfall in selected localities on Great Plains.

the Shelter Belt (Hays, Kansas) or on its western margin (Bismark, North Dakota, and Culbertson, Nebraska) are shown by the solid lines of the diagram. The rainfall at Bismark decreased during the early part of the record, but has been fairly steady for three decades. Culbertson shows a fairly steady increase for the last twenty years, while Hays shows fluctuations. The significance of all this is that the climate of the Shelter Belt, as of other regions, is subject not only to the small cycles usually recognized, but also to long cycles which may have a length of a hundred years or more. Moreover, in no case have we any proof that the driest condition has yet been attained. The history of countries like Palestine, and the rings of growth of the big trees which record the climate of our western states for two thousand years or more, provide abundant evidence of cycles having a length of centuries.

Unfortunately, we know nothing about the future course of the cycles, and guesses are very hazardous. The situation is rendered still more confused by the fact that the curves here given indicate that even in neighboring regions the cycles are moving in different directions. On the whole, the northern part of the Shelter Belt appears to be growing drier, whereas the rainfall of western Oklahoma and northern Texas appears to be increasing. In no case have we any indication that the most extreme conditions have yet been reached. At Leavenworth, where the oldest record for this region goes back to 1836, the highest rainfall ever recorded was in 1858; the lowest was in 1864 and the next in 1843. In general, the longer the record the greater the extremes.

From all this it is evident that the success of the Shelter Belt plan is purely a matter of chance. It depends on the direction in which the climatic cycles happen to move. If the present tendencies continue, we may expect the Belt to be a failure in the north and a success in the south, but the reverse may actually prove to be the case, or both parts may fail or both succeed. In any event it seems almost certain that even if the trees should be planted and should be favored by good weather for a few decades, their effect on the crops would be limited, and other droughts like those of 1934 would in due time be sure to kill a large share of the trees.

All this suggests another and far less expensive method of meeting the problem of our marginal lands. Probably no scientific discovery would benefit American farmers more than would the ability to predict the general character of the weather six months or so in advance. Many helpful lines of investigation are known, but the great hindrance is lack of funds and workers. The Weather Bureau ought to have half a million dollars per year—only ten million dollars of capital investment—with which to employ skilled men for research only. Today even the best research men there devote a large part of their time to routine administrative work with which they never ought to be bothered. Instead of a Shelter Belt why not discover when to plant marginal lands and when to refrain from planting? The disasters which may overtake a marginal region through failure to realize the potency of climatic cycles are illustrated by Ireland. Many of the troubles of that country are due to the fact that it lies on the border of the region that is adapted to agriculture. Along the west and north coasts even at sea level agriculture is almost impossible during many seasons because the summers are so cool, cloudy, and rainy. Everywhere an altitude of a thousand feet lowers the summer temperature so much that practically no crops can grow. Moreover, climatic cycles, like our present disastrous cycle, sometimes put practically

the whole country beyond the limits of agriculture. Thus Irish agriculture is highly unstable in the typical marginal fashion. On the other hand, as a cattle and dairy country Ireland is far from being marginal. The cool, moist climate is highly favorable to thick, nutritious grass. During the mild winters the grass remains green until December or January, and cattle can eat the brown grass during the rest of the winter. Moreover, in a cool climate of this sort, which nevertheless is free from extreme cold, cows not only give more milk than under other conditions, but the milk is especially rich in butter fat. Accordingly until the eighteenth century Ireland depended primarily upon cattle for a living, and today the same thing is true.

Between these two cattle periods Ireland suffered an epoch-making catastrophe because a new discovery suddenly changed the whole aspect of life. The discovery was quite simple—merely that potatoes, the new tuber from America, would grow well in Ireland. The potato was first brought to Ireland by Sir Walter Raleigh's colonists when some of them returned from Virginia about 1610, but it did not come into common use for nearly 50 years. Then it spread with marvelous rapidity and enabled a constantly growing number of people to find sustenance. At the time of the American Revolution a famous traveller and keen observer named Arthur Young devoted many pages of his book to telling how the Irish had increased in prosperity during the preceding twenty years and how on all sides they were actively clearing new land for potatoes, even on the slopes of the mountains. The whole mode of Irish life changed during the eighteenth century. Potatoes became the main diet in place of milk, or with milk as a minor item. By 1840 Ireland's population was eight times as great as two centuries before. How Sir Walter Raleigh would have hugged himself with pride if he could have known that his simple tuber had so enormously influenced the Irish people!

Alas! Sir Walter did not know that Ireland is a marginal land. Nor did he realize how fickle a thing is climate. Between 1831 and 1842 Ireland found itself in the wet, cool phase of a climatic cycle like the one whose warm, dry phase we are now experiencing. The potato crop was badly injured, and there were six seasons of dearth approaching closely to famine. But still the population kept on growing until in 1845 there were 8,300,000 people, the greater part of whom depended on the potato alone. Then came the climax in 1846 when the potato crop all over the country was almost a complete failure. Relief works were undertaken, and at one time 734,000 people were employed. It was difficult to find work for all at such short notice, and there was much graft. It was not long, therefore, before the projects for supplying work were given up and about 3,000,000 people were on daily rations. It was as if 50,000,000 of our people here in the United States should be fed by the government. In spite of almost superhuman efforts famine stalked the land, and between two and three hundred thousand people perished of starvation and of fevers arising from malnutrition and misery. Then followed the tremendous emigration which has now reduced the population of Ireland to about half what it was in 1845. Today although the potato is still important in Ireland, its position is very decidedly secondary to that of cattle, as it rightly should be in such a marginal country.

This Irish experience holds a vital lesson for America. In the past we have made one sturdy but ineffectual attempt to devise a new method for our dry marginal lands. This took the form of dry farming, whose advocates claimed that

it would redeem the same area which is now to be saved by the Shelter Belt. By its very nature, however, dry farming means a low standard of living, for it obliges the farmer to plow or harrow several times for one crop, and at best it produces only a small yield per acre. Thus for a given amount of work it provides a far smaller return than is received for similar work in moister regions. Moreover, dry farming fails in a crisis, as is abundantly evident in 1934. The situation is much like that of the potato. Dry farming in our semi-arid regions and the potato in Ireland are both highly useful in their proper place, but both fail with disastrous consequences at certain phases of the long climatic cycles. The Shelter Belt appears to be of the same type. In a favorable phase of a climatic cycle, it might work excellently, although probably at very great expense. In a crisis, which may be even worse than that of 1934, it is almost certain to break down as completely as did potato culture in Ireland and dry farming here. Therefore, the wise plan is to study the possibilities of shelter belts by means of small experiments, find out how to make reliable long-range weather forecasts, and meanwhile to convert the Shelter Belt region and the areas farther west into a safe and prosperous cattle country.

STATEMENT ON PRESENT STATUS OF FOREST PRACTICE RULES

By JOHN B. WOODS

Beginning with our October, 1933, issue it has been the practice of the JOURNAL to keep its readers abreast of developments under the Conservation Code (Article X of the Code of Fair Practice for the Lumber and Timber Products Industries). The Forest Practice rules became effective on June first, and since then the foresters connected with the undertaking have been devoting their time and energy to transferring the rules from paper into the woods. A progress report of accomplishment to date is in order and we are fortunate in being able to present here appraisals of the situation, as it appears to them, by two of the Society's members, viz. John B. Woods, Director of Conservation under the National Lumber Manufacturers Association, for the country as a whole; and A. B. Recknagel, Professor of Forestry at Cornell University, for the Northeastern Division.

THE time limit, set by the National Recovery Act, upon all codes, may embarrass us in this task of putting Forest Practice Rules into effect. It is possible that twelve and a half months from June 1st, 1934, may not afford sufficient time to do a complete job; yet, we may be judged on our performance during that short period.

Doubtless most foresters expect prompt execution by industry of its agreed part in the conservation program. To be consistent, certainly they also expect the public to do its part promptly.

When the President heard the report of the conferences, held under the provisions of Article X of the Lumber Code, he indicated his appreciation of the difficulties of bringing about general practice of reforestation, and thought it might take twenty years to reach ultimate success. There was no intimation that this patient attitude was reserved for the public program alone.

Immediately after the President approved Schedule C on March 23rd, 1934, the Administrative Agency of every Lumber Code Division, having jurisdiction over forest operations, selected a number of qualified individuals to formulate rules of forest practice. These committees got to work at once and shortly dispatched such rules to the Lumber Code Authority.

After examination by foresters representing the Forest Service and industry, these rules were amended and unified, and promulgated by the Lumber Code Authority, with the concurrence of the National Recovery Administration. On June 1st, they became obligatory on all persons subject to the Lumber Code. The adequacy of these rules, as a beginning of sustained forestry, is generally admitted.

At the time of meeting with the President, the spokesman for the public agencies concerned announced that the Secretary of Agriculture and the Chief of the Forest Service had a definite plan of public action, involving federal legislation, which they desired to present for the President's approval at an early date. At that time, February 23rd, 1934, Congress was doing just about what the President asked. When, on May 9th, the public program finally was presented for presidential approval, the Congress was swamped and somewhat out of control and determined to go home. The President flatly declared "thumbs down" on any legislation.

A survey of accomplishments between March 23rd and June 1st indicates that industry did what it agreed to do, while the public agencies failed to seize the psychological moment and obtained from Congress exactly nothing.

It is understood that the Chief For-

ester asked for an appropriation of $250,000 to enable the Forest Service to cooperate with industry in applying the Forest Practice Rules, and that he was instructed by the President to take his request to NRA. It is further reported that NRA declined to furnish such funds, giving two reasons: first, that the money was not available; second, that the administration of conservation measures under the Lumber Code is an enterprise in self-government by industry and regulation by a federal bureau is not provided under Article X.

It is evident that the Forest Service can contribute to making effective provisions of Article X and its Supplements by lending counsel to the Division Agencies and by conducting studies aimed at selective logging and the blocking up of sustained yield units, and by other appropriate activities. The help so far given has been of substantial value, so long as it has been kept on a basis of cooperation in compliance with Schedule C. The idea that the Forest Service is called upon to act as police force is objectionable to the Lumber Code Authority and to all persons operating under the Lumber Code, because it violates the spirit and intent of the National Industrial Recovery Act.

Since June first, industry has tried with considerable success to apply Forest Practice Rules. Approval of budgets for forestry work was asked in May, but was not forthcoming from NRA until late August. Of course, the work went ahead in the stronger divisions regardless, but lack of funds had a deterrent effect in some regions.

The failure of NRA to approve the so-called President's Amendment to Article II (a) of the Lumber Code, which would permit the regulation of the cutting of forests for other products than poles, piling, cross ties and lumber, has handicapped the work in all Divisions east of the Rockies.

Other groups, having conservation codes pending, have obstructed the application of Forest Practice Rules in several localities. But despite all of these harassments beyond our control, we find that ninety days after the effective date, approximately sixty per cent of all lumber being produced comes from operations where Forest Practice Rules are in process of interpretation and application. As always, the larger and more responsible operators are leading the way.

It should be understood that the administration of the Lumber Code during the past three months has been an almost impossible task. One crisis has followed another and the situation has been made more hazardous by the re-organization of NRA. In the face of such conditions, it is not strange that the Forest Practice Rules may have received less than their due consideration; but when one's house is burning, one wastes little time worrying about the condition of the foundation, although admittedly, the foundation is necessary if the house is to be lived in afterward.

The industry is traveling a hard road and in the load it must pack, Article X is one of nineteen articles, all equal in the eyes of the law. As the problems affecting the very existence of our Code are unloaded, the Forest Practice Rules will assume their true weight and importance.

Congress adjourned in mid-June. Industry had waited vainly for a sign from the President, indicative of his willingness to support a legislative program in harmony with the recommendations of the forestry conferences. In mid-May, Wilson Compton had addressed to the President a letter, containing the following paragraph:

"As a responsible official of the Forest Industries, as one who for fifteen years has sought a practical basis for concerted action in forest conservation, who knows the importance of a willing

and helpful attitude on the part of individual forest land owners, I earnestly urge you, before the Forest Code goes into effect on June first, to do something and to say something of your plans and your purposes to establish the recommended public forestry measures."

In mid-June, he received from the President a letter reading as follows:

"The issuance of such a statement as suggested in your letter of May 16th has been under consideration. Since it would undoubtedly advance the general forestry movement and aid in putting the rules of forest practice under the forest industry codes into effect, I shall be glad to issue such a statement in the immediate future. An attempt is being made to work out practical means of accomplishing some, if not all of the other matters which you suggest."

It is now the end of September and no such statement has been issued, and the public program remains just where it was on March 23rd, 1934.

THE FOREST PRACTICE RULES UNDER THE LUMBER CODE AND THEIR PRESENT DEVELOPMENT IN THE NORTHEAST[1]

By A. B. RECKNAGEL

Professor of Forestry, Cornell University

A YEAR ago at a meeting of the Northeastern Forest Research Council at Bartlett, N. H., I had the privilege of presenting the proposed procedure under the Lumber Code with respect to Article X of that Code. At that time the National Conferences with the Secretary of Agriculture had not yet been held. These conferences, as you know, took place in Washington, the first in October and the second in January and as a result thereof the Lumber Code was amended by executive order of President Roosevelt effective March 23, which put into operation the so-called Forest Conservation Code. This has been published as Vol. I, No. 95 of the Lumber Code Authority and may be obtained from their office at 1337 Connecticut Avenue, Washington, D. C.

This code provided that on or before April 15 each agency, meaning in the case of the Northeast the Northeastern Lumber Manufacturers Association, should formulate rules of forest practice and submit them to the Authority for its approval.

Throughout the fall and winter the "Northeastern," through a duly appointed committee and following several public meetings, worked hard to get these rules into shape and finally this was accomplished with the good help of members of the Forest Service, state foresters, and other members of the profession.

The Lumber Code Authority in Conservation Bulletin No. 10 issued May 29, officially approved these rules and they became effective June 1. If any of you have not seen these rules, I suggest you ask for a copy either from the Northeastern Lumber Manufacturers Association, 122 East 42nd Street, New York City, or from the Lumber Code Authority

[1]Presented at the meeting of the New England Section, Society of American Foresters, Rangeley Lake, Maine, September 3, 1934.

in Washington at the address given above. The serial number is 126 of Vol. I, Lumber Code Authority Bulletin.

It would seem, therefore, as if the stage was set for a long desired consummation of private forest practice in the Northeast. However, there was a large and obstreperous fly in the ointment. The Lumber Code did not include in its jurisdiction any of the minor forest products and therefore, way back in March, President Roosevelt proposed an amendment to the Code whereby pulpwood, mine timbers, acid wood and other minor forest products would come under the jurisdiction of the Lumber Code. A hearing in Washington on this amendment on March 12 brought forth no serious objection. Nevertheless, it was apparently sidetracked, pigeon-holed and otherwise held up so that up to this date we have had no action on the amendment. Meanwhile the pulpwood association was formed and presented a code of its own for pulpwood. Several hearings were held in Washington and again action was delayed so that at present writing (August 21) we still have no pulpwood code. Nevertheless the pulpwood code if and when approved will contain substantially identical conservation provisions with those under the Lumber Code.

The unfortunate situation is this, that failing to get pulpwood and other minor forest products included the Directors of the Northeastern Lumber Manufacturers Association by formal resolution refused to take any steps toward enforcement of the Forest Practice Rules and furthermore it is left to the Pulpwood Authority, which will administer the pulwood code, to "so far as practicable cooperate with the Code Authority and subagencies under any other code of fair competition which contains provisions for forest conservation."

In other words, we have no measures of avoiding duplicating and overlapping in the administering of the forest conservation provisions as between pulpwood and saw-timber.

The Forest Practice Rules for the Northeast are frankly based upon the Swedish system. Those of you who are familiar with this system do not need any further explanation. But those who are not, might be interested to read the brief description in the JOURNAL OF FORESTRY for December, 1933. It therefore is logical that the northeastern rules leave it to the local committees to draft locally applicable rules and the whole program hinges on the appointment and functioning of these local committees. It is therefore doubly unfortunate that the local committees have not yet been appointed and indeed cannot be appointed until such time as it is definitely known just where pulpwood will come into the picture.

I have refrained in presenting this situation from criticising or blaming anyone. I cannot, however, omit saying that the industry has loyally and fully done its share toward bringing about not only the enactment of the Forest Practice Rules, but their enforcement. If we are no further on the road toward actual achievement of forest practice on privately owned timberland in the Northeast the fault is emphatically not of the industry or its representatives.

In a recent letter Secretary Reed of the Society wrote to President Chapman as follows:

"Some of our profession whose enthusiasm and idealism outruns their practical experience and practical knowedge of the industry will no doubt pervert this situation (Article X 'playing second fiddle') in a manner to sabotage the Article X undertaking. . . . As I understand the 'Spirit of the New Deal,' its primary purpose is to save men. The primary purpose of the Lumber Code is to stabilize that industry, so that it can permanently employ as large a number of men as possible at a satisfactory scale

of wages. The attainment of that objective comes first and ahead of the secondary problem, namely, to save trees. If, in working out the problem of saving men, the task of saving the trees will have to be deferred for a little while, one truly imbued with the 'Spirit of the New Deal,' even though he may be a highly idealistic forester, would, I fear, hardly be living up to his ideal if he should attack the Lumber Code undertaking."

This was so much to the point that I have ventured to quote it and in doing so I give it my hearty endorsement. I feel that the Lumber Code undertaking is the greatest forward step which the industry has experienced since it entered the doldrums and if foresters cannot see the need of just such measures as are contained in the Code they would be dull indeed. However, we must realize that the Code will terminate in June of 1935 unless Congress extends the National Industrial Recovery Act. If it is not continued, then, unless steps are taken, the Forest Practice Rules will go into the discard together with all the other provisions of the Code. It would seem, therefore, as if the Society should actively urge upon the Administration the need of perpetuating this substantial advantage of the Lumber Code, namely the Forest Practice Rules and if it be possible lead them out of the entangling connections of the Lumber Code into a single clear cut Conservation Code which will apply not only to manufacturers of forest products, but to the timberland owners direct. Only in this way is the responsibility properly fixed for the management of privately owned timberland.

In conclusion, it is impossible at this time for any one to prophesy what will happen to the NRA or the Lumber Code. Certain features of it, such as control of production and cost protection are subject to criticism and will no doubt experience modification and amendment. Indeed it is possible that cost protection, or price control, will be entirely eliminated, even though this is one of the substantial advantages which members of the industry have obtained through the Code. But whatever the modification and amendments may be, it would seem obvious that the great single advantage of the Code to all regions alike is found in the safeguarding of the natural resources on which the industry depends and therefore the administration will find ready cooperation in making the Forest Practice Rules not only fully operative for the present, but permanently a part of the forest management of privately owned timberland.

The part which New England foresters can play in this is obviously very large, not only in connection with such properties as they may themselves be managing, or in their rôle as state or federal foresters, but as a group of men of experience and maturity, they can guide and advise the men whose duty it is to choose the local foresters of the various state boards. By such coöperation we will be sure to get the right men in the right place and if I have anything to do with the selection of the men who will be foresters under the Forest Practice Rules for the various state committees of Forest Practice, I will certainly consult with the members of the Society and with the New England, New York and Allegheny Sections.

REGULATING THE CUT BY THE CONTINUOUS INVENTORY-FLEXIBLE ROTATION SYSTEM

By BURT P. KIRKLAND

United States Forest Service

A growing practice of cutting selectively by groups and single trees has resulted from the disclosures, in logging and milling studies, of the losses from cutting financially immature trees. This imposes upon foresters the necessity of developing workable methods of regulating the cut, which will facilitate these changes in cutting practice. Mobile logging operations are readily being adapted to removal of trees and stands wherever desired. Short cutting cycles are permitting the utilization of trees when their values have culminated and are cutting down losses from disease and insects. To match these conditions the forest manager needs a continuous inventory which will enable him to direct cutting operations to each class of financially mature timber just when it is in the highest demand and at the highest value. Theoretical rotations fixed in advance on the basis of future costs and returns estimated decades in advance can have small place in such a method of regulation. In the following pages an attempt is made to formulate a method of meeting these practical requirements which can be operated at low cost by virtue of utilizing for permanent records data which have usually been compiled only for temporary information.

IN attacking this problem in American forests it should be recognized that, since we are dealing with forests subjected to no regulation in the past, immediate imposition of too much regularity is likely to result in excessive financial losses. Furthermore, in private forests the immediate financial necessities of the owners transcend any theoretical considerations. Fundamentally, regulation is governed by two aspects of forest management: first, current income, and second, conservation of capital values.

Current income cannot be put on a favorable basis merely by utilizing a certain volume. It is necessary that this volume be selected from such locations and such size classes as will yield a wide margin of value above costs. Since annual growth in a managed forest seldom averages more than 2 to 5 per cent of the growing stock, the annual gross financial returns cannot exceed this rate if the material cut does not exceed annual growth in volume and is only of the same average value as the growing stock. Where possible, therefore, cutting should be so managed that the material cut will have two or more times the average value of the growing stock. This can ordinarily be accomplished only by prolonging the rotation in selected portions of the stand until products of the highest value, such as veneer logs or high-grade lumber logs, are obtained. A selection system, under which large groups as well as single trees are cut where necessary, is adapted to accomplishing this without sacrifice of the income that can be obtained by marketing materials of ordinary grade such as pulpwood, fuel, posts, poles, and low-grade logs. Proper removal of these products favors and hastens the development of the better species and individuals. Eventually the forest so managed will yield a large quota of high grade products with a lesser volume of the cheaper materials.

The value of the forest property as a whole depends largely on the net income obtainable by these selective cuttings. If valuation is as rigorous as that applied in the security markets, net income in a 10 to 20 year period must equal capital value at the beginning of the period.

The second basic financial requirement, conservation of capital values, ac-

cording to the analogy of the security market demands that the forest capital be kept in condition to yield in succeeding 10 to 20 year periods current returns at least equal to those of the first period. This requirement can be met only by maintaining a growing stock adequate in quality as well as in quantity. Quality means correct species and a liberal representation of the larger size classes.

If high present value of a forest is conditioned on the presence of matured merchantable timber in quantity sufficient to allow a cut of high-class material each 10 to 20 years the income from which equals the initial capital value, it is obvious that either for appraisal or for management the first step is inventory.

Forest Inventory

The procedures here discussed are designed to minimize costs of inventory and other management costs, at the same time obtaining more effective results; collection of useless or temporary data is restricted to a minimum and an effective record system for essential data is provided.

Inventory should be considered from two aspects corresponding to the two aspects of finance, namely current income, and permanent capital. The first aspect demands inventory, on each management unit, of the material that may appear in cuttings of the next 5 to 10 years, as a prerequisite to planning cutting operations on a sound basis. The second demands inventory of the residual growing stock that forms most of the remaining productive capital of the forest and this can frequently be better made as the cutting progresses. The division of inventory into these two phases reduces inventory costs to a low point.

The first inventory, confined to larger merchantable sizes of important species to be cut within 5 to 10 years, need not be highly accurate and can therefore be performed at low cost. This inventory can be conducted by strips or sample plots in such manner as to reveal the merchantable volume in these categories for the entire property, omitting the smaller size classes of doubtful maturity. It indicates the location of the merchantable timber on the basis of a tentative division of the property into divisions. (Permanent divisions are to be set up as cutting progresses over the property the first time). On the Pacific Coast, inventory for this general purpose need not include ponderosa pine and western white pine less than 20 inches in d.b.h. or timber of other species less than 30 inches d.b.h. In the South the smallest size that need be included is 14 inches, and in New England 10 inches. Generally these are the low diameters for financial maturity of saw timber in these regions. After this first general inventory, the expense of periodic inventory of entire properties can be avoided by relying for all management data on careful division inventories made and recorded as cutting proceeds.

These succeeding inventories will be mostly a charge against utilization and in any case will be only a small item of annual expense. They can be made at the most favorable season or when they will least interfere with other work. If properly devised, they will provide a record of the actual stand as it exists before cutting and immediately after. The figures covering the volume cut should be correlated with figures showing what portion of this volume was utilized and what portion became waste. Inventory should always be taken in terms of total cubic volume of stems to say 6 inches d.b.h., including volume of the stump and of the tip. General utilization studies usually form the basis of

judgment as to percentage of stems utilized. From time to time, however, a survey of utilization practice on the property should be made, for two primary purposes. First, to preserve a record of utilization efficiency. No more important measure for improving returns from forest management is available than improvement of utilization standards through such coördination of wood uses as will leave large trees for saw timber and for other uses requiring large size, while pulpwood, posts, poles, etc., are supplied from thinnings and other subordinate cuttings. Second, to provide information on the basis of which converting factors (by diameter classes) can be set up to facilitate an accurate conversion of cubic-volume cruises (full stem volume) to terms of utilized material, whether in board feet, cords, or some local or temporary standard. The necessity for better utilization, with coördination of different uses, precludes permanant use of measurement units other than those of cubic volume.

Both the inventory and the survey of utilization standards should be conducted as a part of timber-sale or timber-cutting plans. The field work will be little, if at all, in excess of that usually performed in connection with preparation for timber operations.

Regulation and Allocation of the Cut

The cut, as discussed below, includes financially mature material (final cuttings), thinnings, salvage, and other subordinate cuttings. Voluminous data from logging and milling studies, while not yet all formulated in usable form, indicate that in all regions the larger sizes yield far larger gross values per unit of volume and that they can be logged and manufactured at lower cost, so that the net value increases faster with size than does the gross value. In applying this information we can deal directly with size and silvicultural characteristics of individual trees or stands. We can not, however, entirely ignore the fact that size depends on age. These studies indicate for a portion of the stand much longer rotations than we had believed necessary before the true importance of *quality* production was recognized.

These considerations have a strong bearing on the type of inventory necessary for forest regulation purposes, and support the methods already recommended. Since we have practically no normal forests, we are nearly always confronted either with the problem of building up growing stock (the typical case in the eastern United States) or with that of liquidating a financially mature surplus (typical of some western forests).

In connection with the periodic inventory preparatory to cutting, a sufficiently close investigation of the current rate of growth on diameter classes immediately above and below the probable diameter cutting limit should be made to assist in determination of that limit. A closer examination of growth rates in the small timber (12- to 20-inch trees), medium timber (22- to 40-inch trees), and large timber (42 inches and over) should be made in each stand at the time of cutting. In the eastern forests the sum of the net current growth on established trees in all divisions should usually not be exceeded by the annual cut. In some western forests there is a surplus growing stock which justifies a liquidating cut in excess of the growth.

When the first inventory at the time of cutting is made and when the permanent division lines are established, site determination will naturally be undertaken.

Growth information, especially that in the first general inventory, cannot always be given primary weight in determining

cutting policy for the first one or two management-plan periods, because readjustment of the capital investment is the first major problem in introducing forest management. Heavy losses have occasionally occurred because of overlooking this necessity. Almost exclusive reliance must be placed on the inventory of available financially mature and accessible timber. This volume should be divided by the number of years which all considerations indicate as the period during which it should be removed. The result is the annual cut of financially mature timber. The period will usually be not less than 5 years nor more than 15. The rate of removal having been determined on a conservative basis, cutting can proceed in those stands where low earnings or other reasons make it most urgent. The criteria of choosing stands for cutting have been set forth by the writer at some length in a previous article.[1] The same financial principles apply in choosing individual trees in selective cuttings. In a recent article Wackermann has described a very effective method for short cuttings cycles.[2]

The cut of *financially mature* high-grade timber, although it represents most of the income, is not the whole cut. It is of importance to the forest owner and his community that the forest give as much support as possible to labor. Therefore, in addition to the cuttings of high value material, each stand should be cleaned of all trees *not useful for further growth* that will pay for removal. In most regions these improvement cuttings will yield cordwood, pulpwood, low-grade saw timber, and other products. They assist in putting the stand into good condition for further growth and, where necessary, for regeneration.

After these cuttings have been completed in any division, the accurately inventoried stand is due to be left undisturbed for a cutting cycle. It has been indicated that, in connection with the inventory, current growth on diameter classes from 6 inches up should be measured. No further inventory will be necessary until in 5 to 15 years the area is again ready to be cut over. Then a marking crew will again go over the area, mark trees to be cut, and take inventory of those to be cut and those to be left. The difference between the new inventory and the old will show the effective volume increase for the period in terms of total cubic volume. To get complete figures on production, the cubic volume of trees removed between inventories must be added. Losses from mortality of trees not salvaged may be ignored. The current standards of utilization will determine the percentage volume to be utilized in each tree class.

In marking, a somewhat flexible diameter limit will be used. With due regard for current income, the marking at each cut will aim to build the growing stock toward the ideal species composition and toward the size classes that will yield the largest earnings. In this way productivity can be constantly built up and the individual skill of the forester can be checked by accurate cumulative records of effective growth in cubic volume, utilized volume, and net returns.

Division of Area.—It is obvious that the foregoing methods can be applied only where the forest property as a whole is permanently divided into fixed

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[1] Flexible Rotation in American Forest Organization. Jour. of For., Vol. 23 No. 2, pp. 136-147. 1925.

[2] Wackermann, A. E. Allocating Cutting Budgets by Means of a Forest Skyline Graph, Jour. of For., Vol. XXXII No. 1, Jan. 1934.

management units (blocks, divisions and subdivisions). It is a mistake to locate boundaries of these divisions at the time of the preliminary management plan. If made on the basis of information then available, they are sure to be poorly located in places. A tentative subdivision of area can be made then, however, for the purpose of allocating timber cruises. Permanent division should be made and boundary lines established as cutting under regulation proceeds over the forest the first time. It has generally been customary in planning utilization operations to make an intensive study of the area involved including topographic mapping. In connection with that study the permanent division boundaries will be set up, consisting as far as possible of natural boundaries such as roads, streams, ridges, and property lines. Usually the area forming a single skidding or hauling chance is placed in one division.

Thus each area, as it is first cut over, will have been subdivided into logically based divisions, each provided with an accurate timber inventory by species and by 2-inch diameter classes from 6 inches up. Successive cuts, with the inventories of residual stands, will establish the actual rate of growth in terms of total cubic volume and of used volume.

Revision of Management Plans.—When revision of the management plan becomes necessary, each 5 to 10 years, the division inventories can be adjusted to date by adding growth from the time they were cut over. Even without this adjustment the slow changes due to growth will not introduce inaccuracies greater than those usual in inventory estimates. In fact, the accurate inventories at the time of cutting, as described above, will unquestionably result in a more accurate summary for the forest property than can be given at reasonable cost by any type of general periodic inventory.

The Forest Records

The use of this system requires a simple but adequate system of records. Only two principal classes of record are necessary, namely, growing-stock records and financial records.

Growing Stock Records.—For each forest division, a permanent growing stock record will be necessary, which should show at least the data already discussed under forest inventory. This record may conveniently be along the following lines:—

1. Inventory per acre before or after cutting, showing number of trees, basal area, height, total volume and volume growth for each diameter class.
2. Inventory and yield for the division before or after cutting, showing total volume, volume of sawn timber and volume growth for each diameter class.
3. Timber removed and timber losses during the cutting cycle, showing number of trees for each diameter class and total volumes for the division.
4. Material sold, by class of product.

It will be recognized that these records are based on field data almost invariably obtained on sample plots or strips or through a tally of all trees in connection with cutting operations. The procedure here suggested involves no extra expense for field work unless such work has customarily been carried on in a careless manner. The change from ordinary practice consists in compiling data ordinarily used solely for control of cutting operations in a manner to serve as an important permanent record. Aside from the small amount of time consumed in recording volumes of timber cut in the intervals between major operations, the extra work involved in compiling the data in this form cannot require more than one or two day's office work per division at the time of each major cutting opera-

tion. With a 10-year cutting cycle, this means one or two days per division each 10 years. As against these minor requirements, the cost of general timber survey at each revision period is completely saved.

This method provides a live, continuous inventory record for every forest division of the actual growing stock in the woods. It corresponds to the stockroom inventory record in an efficient factory. On the basis of the records thus obtained special demands for timber can be met at any time without the delays incident to sending out a scouting expedition. With their aid maximum returns can be realized from stumpage sales.

This method corresponds, in simplified form, with the procedure followed in France and Switzerland, where regulation by "La methode du controle" [3, 4] is extensively practiced, and appears reasonably well adapted to meet requirements in most American forests managed under any pretense of intensive management. Since the stand table shows number of trees, basal area, cubic volume, and rate of current growth for each diameter class, each successive cut will show just what progress or retrogression has occurred in the growing stocks since the preceding cut. This will be of the utmost value in guiding the marking on the division. Regulation of the cut becomes largely automatic, based on the continuously recorded experience of growth and stand conditions.

It should be remembered that by this continuous inventory method, only a few divisions will be treated annually; on a 5,000-acre tract, 5 to 10 years each, on a 50,000-acre tract 30 to 50 larger ones annually. Only an inclination toward systematic procedure on the part of the management will be necessary, therefore, to insure a careful and complete job on these divisions. The results should be immeasurably more accurate than those now attained in forest surveys covering entire properties at once.

Maps.—No system of forest records is complete without an adequate map system. Experience indicates the desirability of mapping divisions on the rather large scale of 1 inch to 200 feet. Each division map is made at the time when the division is first cut over and is tied to the primary control survey of the property. Thus a detailed map covering an entire property not previously under management will be produced only over a period of several years, but will then be permanently available.

General maps to a scale of 8 inches to the mile and 2 inches to the mile will be found convenient.

Financial Records.—The other essential record is an ordinary double-entry accounting system specifically adapted to forest accounting. This assumes effective devices such as columnar journals, etc., for accumulating and distributing financial data, and that there shall be a division ledger in which each division has an individual account. In operating these book accounts annual expenses such as fire protection will ordinarily be charged off to annual operations. Anything in the nature of capital expenditure will be charged to the proper forest-improvement account or, if incurred through work such as stand improvements or planting, to the proper division account. Receipts from any source will be credited to the

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[3] Borel, Wm., Guide pour l'application du controle aux futaies jardinees. Jaques et Demontrand: Besançon, (France) 1929.

[4] Biolley, Dr. H. E. Penser d' abord agir ensuite et la Methode du Controle, Jour. For. Suisse, May, 1929.

proper division. On or after December 31 following any periodic cutting operations in any division, the capital account for that division will be readjusted to a basis of true value after the cut. In this adjustment profit or loss will be disposed of through the profit and loss account. If the business is to be successful, the division cut over in the normal year must yield an adequate net return for the whole property. With a 10-year cutting cycle about one tenth of the area will be cut over annually. It is obvious that, as in the case of division growing-stock records, only a few division accounts will be active in any one year. In posting credits covering timber sales to divisions it will be desirable that the species, quantity, units, and total prices be shown. This information is bound to be of increasing importance as time goes on.

On the basis of these simple records the whole forest business can be systematized and controlled in a manner to make the property in the hands of a capable manager yield the best possible results.

Summary

These proposals contemplate regulation of the cut by methods free from overrefinement during the initial period of forest management. At the beginning the cut will be fixed on a basis of spreading the cut of financially mature timber over as many years as will be required for the trees next in size to replace the volume removed or on the basis of the owner's financial requirements. As time goes on data will accumulate showing the actual rate of production in cubic volume and in actual utilized volume. These data will gradually become the basis of regulation going hand in hand with silviculture. Where financial considerations are paramount, the aim will be to build up to the volume and character of growing stock that will provide the best balance between capital and earnings. A silvicultural system is to be preferred under which reproduction and the early stages of tree growth involve little or no cost (the selection system, usually) and under which the supply of medium and large timber produced is sufficient to provide adequate current earnings for the whole property. This balance will generally not be attained until a growing stock of considerable volume has been built up, varying, for selection forests, from about 2,000 to 5,000 cubic feet per acre. This conclusion is based on the general observation that in our anxiety for formulating a sound system of forest finance we have burdened the production of young age classes with costs that in American forests never existed. Skilled management should see to it that these costs never are introduced.

It must be confessed that the present American management-plan practice is anything but satisfactory, owing partly to the heavy cost of adequate forest inventories but even more to the unworkability of rigid provisions based on theoretical considerations and on assumptions as to the conditions that will exist in the distant future. The foregoing proposals rely on existing practical considerations to determine what percentage of the stands is to be cut and other matters connected with operation of the property. They rely largely on the management to do the best possible for the stands in current treatment. They expect and demand that adequate consideration shall be given both to current income and to preservation of capital value. This can safely be done because it is almost universally true that good returns from cuttings now demand raising diameter limits rather than

lowering them. In return for this grant of freedom they make absolute demand for three things in return, namely, that the management allocate all cutting operations to definite divisions of area; that accurate records of the stand before and after cutting be preserved, including precise stand tables for each compartment; and that adequate financial records be maintained.

"The ideal which has given the weekly day of rest so important a place in America has supported the better recreational phase of our life, not merely as a time to abstain from labor, or to secure physical exercise, but as offering also opportunity for spiritual reinvigoration. We are coming to learn that life is worse than useless if it does nothing more than connect a chain of circumstances permitting continued existence in the physical sense without mental or spiritual growth." * * * * * *

"In contrast to the situation in National Forests, protection of National Parks is not supported by economic value. Today one of the questions of most critical importance in consideration of National Park policy concerns what is known as 'complete conservation,' or protection with all natural features unimpaired. In my judgment, not alone recreation as commonly interpreted—not even education in its routine aspect—can guarantee unbroken maintenance of primitive conditions in National Parks if great economic resources are involved, since both recreation and education can be made to operate along with economic use. But a function of such importance as to insure complete protection is, I believe, given in abundant measure through the higher educational and spiritual values, which offer the greatest and most noble uses to which any possession may be put."

JOHN C. MERRIAM,
President, Carnegie Institution of Washington.

PROGRESS IN PROMOTING THE USE OF TIMBER CONNECTORS

By ARTHUR T. UPSON and HARRY UHL

National Lumber Manufacturers Association

INCREASING the utilization of timber by decreasing the amount used—a statement which, by the way, will not seem so paradoxical upon close examination—is the function of a device called the "modern timber connector," which has been described by Wilson Compton, general manager of the National Lumber Manufacturers Association, as "the most important development in wood construction in a century." This contrivance has widened the field for use of wood framing through its ability to reduce the amount of timber required for carrying given loads by as much as 30 per cent.

Prior to the invention of these connectors, engineers were constantly confronted with the fact that bolted joints of timber-framed structures were not equal in strength to the cross section of the various members in an assembly. It was therefore a necessary practice, when designing for heavy timber construction, to use only 40 per cent to 60 per cent of the allowable working stress for timbers, to the end that a large volume of wood for bearing area at joints be made available. This may sound very technical to the non-engineering mind; reduced to simplest terms it means that a joint formed by bolting two wooden pieces together in the old-fashioned way was not so strong as either of the pieces themselves. For that reason, in many instances twice as much structural timber was employed to give strong joints as was actually necessary between the joints for carrying given loads.

Like many other revolutionary devices, the modern timber connector is a simple affair indeed. The three types commercially available in the United States were developed shortly after the World War, and their ability to do the job for which they were invented is attested by their constantly increasing popularity, particularly in Europe, where engineers were quick to see the advantages in their use.

The connector is enabled to do its job because when placed between the surfaces of timbers at contact points, more load is transmitted per square inch than is possible with bolts alone. A bolt or a series of bolts in old-fashioned timber framing concentrates the full load on the small areas against which the bolts bear. The timber connectors, however, enlarge the bearing area and distribute the loads more uniformly over the width of the pieces involved, thus reducing the unit stresses on bearing areas and strengthening the joint some times as much as 100 per cent.

There are several types of these connectors commercially available in this country. One, called the alligator type, is a double-toothed ring of corrugated sheet steel. This is merely placed between the adjacent faces of timbers in such a way that the toothed ring centers on the center of the bolt hole. The timbers are then drawn tightly together by the use of a ratchet wrench and a high-strength nickel steel bolt which is temporarily placed in the bolt hole. As the faces of the timbers come together, the toothed rings are firmly embedded in the wood, the teeth entering each timber to one-half the depth of the ring. As soon as embedment is effected to such an extent that the surfaces of the timbers fit snugly together, the high-strength tool

bolt is removed and replaced with an ordinary bolt which remains permanently in position. It is the job of this bolt to hold the timbers and the ring together, but not to carry the load of the joint, as that job is attended to by the toothed-ring connector which transfers stresses from one timber to the other.

Another type of connector which has found favor both here and abroad is the split ring variety. This is a perfectly plain, straight-edged, steel ring, with a tongue and groove break. Its position in a timber joint is similar to that of the toothed- ring or alligator-type connector, except that, instead of being self-embedded through pressure, it is placed in grooves pre-cut in the adjacent faces of the timbers to a depth in each timber equal to half the depth of the ring. The ring is placed in the groove of one timber, the other timber placed over it, and the two pieces drawn tightly together by an ordinary bolt which remains in the joint. When under load, the split ring, being slightly flexible because of the break in the circumference, bears against both the outside rim of the groove in which it is placed as well as against the core of the wood encircled by the groove. The groove is made by a very simple tool which, because of the fact that it works from the center of the bolt hole, insures that the grooves in the adjacent timbers forming the joint will be exactly opposite each other.

Still another type of connector is the shear plate, which is a device for transferring load from steel to timber, or vice versa. It consists of a toothed plate with an annular hub. The plate is embedded in the wood somewhat after the manner of the alligator or toothed-ring connector, while the hub fits into a hole in the steel, the whole assembly being held together with a bolt.

There are more than sixty kinds of timber connectors in use abroad, but the three described above are among those which have thus far become the most important commercially. Introduced here from Europe by the National Committee on Wood Utilization, (now a part of the Forest Products Division of the U. S. Department of Commerce[1]), the timber connectors are handled in this country by the Timber Engineering Company, a subsidiary of the American Forest Products Industries, which is an affiliate of the National Lumber Manufacturers Association.

Connectors are effective with any species of timber which might ordinarily be used in the old-fashioned method of framing. The economy of their use has been demonstrated to a great extent abroad, where they have been employed in practically every type of construction, and particularly in such spectacular structures as radio towers, some of these being over 600 feet in height. Wood is the preferred material for these towers abroad not only because of low cost of construction, but the high degree of insulation as well, and designs for towers of the desired height were made possible only through the stronger joints effected by these connectors.

However, the possibilities of high-tower construction through the use of these connectors have not been by any means overlooked in our own country. An outstanding example is WEBC's new single tower which reaches 350 feet toward the clouds from the Lake Superior flats at Superior, Wisconsin. This new shaft, built to hold the station's vertical antennae, attains its lofty height by the placing of WEBC's old 230-foot steel structure upon a new 120-foot tower built of wood. Concrete piers embedded in the ground support the base of this wooden tower, which is 35

[1] Intensive tests have been conducted at the U. S. Forest Products Laboratory, Madison, Wis. Results appear in bulletin Modern Connectors for Timber Construction.

feet square at the bottom and tapers up to 12 feet square at the point where the old tower is joined. It may prove the pioneer which will usher in a new and more economical method of radio tower construction.

As a matter of fact, several all-wood radio towers have been built to date, one of them being the highest wood tower in the world, recently completed at Muehlacker, Germany. This shaft attains a height of 190 meters, or about 625 feet, and supports at its top an antenna ring 10 feet in diameter, weighing 1,320 pounds.

While these radio towers furnish probably the most spectacular illustration of the versatility of wood, they do not by any means encompass the field in which wood construction has been made easier and cheaper through the use of the new connectors. Vienna, for instance, boasts an auditorium with a seating capacity of 70,000 and with a clear unobstructed wood-roof span of more than 190 feet. In this country the new type of construction has also been used in fire lookout towers, bridges, platforms, warehouses, garages, hangars and a multitude of structures in which, without the aid of the connector, steel would probably have been the material employed.

More than seventy structures using tens of thousands of timber connectors and approximately eight million board feet of dimension and timbers have been built in the United States in the last eight months. The woods used were largely red cypress, Douglas fir, larch, southern pine and California redwood. Included were seven 100-foot fire lookout towers for the U. S. Forest Service, erected at the same number of places throughout the country, together with others of lesser height. The versatility of the connectors, incidentally, was shown in the construction, for a New England State Forest Service, of a lookout tower built of round timbers and poles adzed to flat surfaces at the joints. The Florida State Forest Service was enabled through the use of timber connectors to build its 80-foot fire lookout tower at Dinsmore of wood.

Other jobs include an overhead highway bridge built for the California State Highway Commission at Preston, California; rock, sand and gravel bunkers for a large dealer in those materials at Berkeley, California, and a riding hall at Upperville, Virginia, the roof of which rests upon seven 60-foot wood trusses made through the aid of timber connectors. The connectors can also claim credit for the employment of wood construction in building the largest cooling tower in the world, which lacks but a few inches of being a thousand feet long. They have also made the use of wood more feasible in form shoring in conduit construction, tank towers, bridges, framing for hospital cottages, scissors trusses in schoolhouse jobs, and roof trusses for theatres, town halls, schools and a school auditorium and university alumnae buildings.

Connector type of construction is increasing in popularity daily, and it has been specified in many important jobs now being built or planned. Prominent among these is a bridge now under construction for the Highway Department of a western state, the main span of which will be a 180-foot, 3-hinged arch, approached by four 38-foot spans with latticed trusses. The contract for this job has just been let. Connectors are also widely used in repairing and remodeling as was recently seen in the strengthening of a water tank tower, bracing a coal dock, and in strengthening the wooden roof trusses in a school auditorium and a railroad roundhouse. Plans for many of these structures, including the now famous WEBC tower, were provided to the engineers directly in charge through the National Lumber Manufacturers Association's research and development agencies.

The Association's engineering staff has just completed a model from plans for

an arched highway bridge with a 120-foot span, supporting a 20-foot roadway. This bridge, designed for "H-15 loading," which means that it would support a parade of loaded trucks traveling, head to tail, as closely together as possible and each weighing 15 tons, could be built easily of timber at one-half the cost of steel—and possibly less than that, according to the proximity of the bridge to the source of timber supply. This bridge would use 15,000 board feet of timbers for girders, 5,000 feet for cross trusses, 2,000 feet for end frames and 12,000 feet for decking, (the floor, averaging 5 inches in thickness, to be covered with concrete) —a total of 34,000 board feet. The height of the bridge would be 30 feet from the base of supports to the road bed. Should the concrete road-facing be dispensed with, an additional 6,000 feet of timber would be necessary as the decking would have to be increased by half. The model, which would enable the observer who is totally unacquainted with engineering problems to see the manner in which wood may be combined with the timber connectors to make an economical method of construction, is constructed on a scale of one-half inch to 12 feet, and needs only a few toy automobiles and trucks to complete the illusion of a link in a busy traffic artery. Plans also are complete for a 60-foot bridge of similar capacity.

In addition to economy of material and labor cost in erection, which means the economical substitution of wood for steel in many instances, the practical advantages of modern timber connectors in construction include speed of fabrication and erection, strength, adaptability to expansion and contraction without loss of rigidity, architectural gracefulness and ease of dismantling without injury to parts. Economy of labor at the site is being increased by shop fabrication, so that the timbers come to the job ready worked for quick assembly, with the result that a bridge can be thrown across a stream almost as fast as the pieces arrive on the job.

Obviously, the interest of the National Lumber Manufacturers Association in the success of its affiliate, the Timber Engineering Company, is provoked not so much through the gratifying increases in the sale of connectors, but through the constantly widening use of timbers which these sales portend. And lumbermen throughout the country are highly gratified because of the new markets made available to their product.

FORESTRY'S PLACE IN THE NEW SUBSISTENCE FARMING PROGRAM

By THOMAS W. SKUCE

Agricultural Adjustment Administration

THE problem today is not so much a lack of productive forests, but an excess of unproductive land. Some of this surplus land is periodically used for agricultural purposes, but, because it cannot produce crops on a paying basis comparative with better land, it is called submarginal.

Experts who are trying to solve the farm problem maintain that if this submarginal land could be taken away from the farmer the result would be better prices for farm products, or at least more generally satisfactory returns from the agricultural use of good lands. Another portion of our idle and unproductive land has never been farmed at all. It has simply been deforested and abandoned, a profitless burden upon the tax rolls of the states and counties.

Both problems are primarily those of land-use. For either of them reforestation or simply proper forest management have been the solutions offered. It is certainly logical to try to make this submarginal and waste land produce the only crop it can—trees. It is beyond all doubt essential to obtain a source of revenue which, throughout wide areas of our nation, have shrunk to the vanishing point.

It is to forest growing that some economists now propose to return land that agriculture does not want. Thus, forestry is inextricably involved in any proposed adjustment of our land problems, and the whole land-use problem has fallen into the lap of the forester. The forester may merely sit by and look at the thing he has in his lap or he may seize the opportunity and get a grasp upon its fundamental possibilities. As a forest economist he may use it and place it on a self-supporting basis with the present economics forest land in use. If he does not act he will see the opportunity grasped by others less qualified to understand not merely the technical difficulties, but also the economic ills which lie ahead.

When forestry is thus viewed as the principal agency in dealing with the land-use problem, its horizons at once expand to unexpected proportions. All forest areas created from present idle and unproductive land may not prove economically justifiable for timber production alone, but the factors of recreational use, fish and game propagation, and even possible residential potentialities, have their bearing here. Reforestation of present submarginal and idle land may be rendered an economically sound project through the ability of the forest to prevent erosion, control floods, and consequently to protect other lands needed for agricultural purposes. Yet a forest created for watershed protection purposes is no less a forest than if it had been established primarily for the production of timber.

In preparing to expand toward these new horizons foresters need to consider very seriously the evaluation in cash of the social services of forests which must be made. There must be some system worked out, since at the present time the incidental benefits of forestry must be left off the books because we have no way to record them in dollars and cents.

A system needs to be developed whereby the water holding capacity of the soil, the land holding power of trees, and the rec-

reational value of a forest background together with the enhanced value of taxable real estate due to improved scenery must be worked out in minute detail because our present day forestry should be much broader than merely that of forestry for timber growing only. The prime objective of public forestry, particularly, should be the greatest development of social benefits from the land. This entails a definition of forestry as a land-use problem much broader in scope than the old school room definition.

Foresters have always held that one of the greatest social contributions of the properly managed forest is support of a permanent population. Furthermore a permanent population skilled and interested in forest activities is a recognized asset to any forest property operated on a perpetual yield basis and is an integral part of any fully developed land-use plan. The operation of such a program is about to become an assured fact. The new program being carried into operation through the subsistence farming, seeks to bring about a better balance between urban and rural life by combining the best use of land with the decentralization of industries in such a manner as to stabilize their existence. The development of a new industrial pattern will leave men with their feet on the soil and yet free them for a part of the year to take their places at factory benches or an assembly line which will yield an immediate cash income.

This program bids fair to possess real merit and yield highly desired results since it combines agriculture and industry with assured success. In the past we have seen any number of land settlement movements in this country become dismal failures through the lack of a "cash income crop," as should be available from industry.

One thing essential to the success and permanence of the subsistence farming unit is the assurance of permanent part time employment. A well managed forest operated on the sustained yield basis carries that assurances to a degree that few, if any other, industries can match.

In Sweden, Norway, Denmark, Germany, Italy, England and even in the Orient subsistence farming has been an essential part of the forest land economy for years.

Private enterprise in this country has been working toward this end for some time past. So, to the forester with huge national, state and private forests holdings is presented the challenge to so use the subsistence farming unit on these areas for the dual purpose of both social and forest welfare. By building a type of forest population best adapted to the forest through such a program wherein the individual and family lives would be closely woven into the whole forest enterprise there would result a population of tremendous value in the future development of the forest and in the forward swing of the whole forest movement in general.

The subsistence homestead units appeal to three distinct classes:

1. The miner in the soft coal regions and in the ore mines of the Lake States and the west.

2. The stranded industrialist such as exists around our manufacturing centers who will never be re-absorbed in industry despite codes that may be established. This is due to the fact that the mechanical improvements with limited established consumption will leave these folks permanently unemployed.

3. The stranded land owner of barren and untillable acres who is usually a "hang over" from lumbering days.

It is in this last class of folks that the forester should be interested in assisting to establish a subsistence farming unit.

In West Virginia we have the Monongahela National Forest and a part of the George Washington unit as well. These two forests have been playing quite a part for sometime past in helping supply the cash income of the small mountain farmer who lives on his 40, 50 or 100 acres of

rough hillside land. What has been accomplished on the Monongahela should serve as a good example towards what might be accomplished in furnishing a sustained existence for a greater number of people on a carefully developed subsistence farming program.

In working out assistance for these mountain farmers it soon became apparent in our state that a goodly share of the program would revolve around the existing units of the national forests lying within West Virginia. The work incidental to the acquisition and improvement, along with fire fighting and other such activities, brought in the necessary cash income for these mountain farmers which was impossible to secure in any other way due to the type and kind of land making up the farms of the region.

To be specific as to benefits as rendered, one allotment of $89,000 coming to the forest through Congressional appropriation in 1931 (which was only a small part of what the total of the entire forest amounted to) will suffice as an example. The benefits accruing to the folks owning and living on the submarginal farms of the region due to the expenditure of the above mentioned amount were derived from the construction of 22 miles of road, 100 miles of trails, one equipment depot and a steel bridge across the Black Water River at Hendricks, which eliminated two dangerous railroad crossings. This expenditure furnished employment for 1,867 men for a period of 15 days each by using the staggering system of employment; that is, 15 days on and 15 days off. Local county relief agencies had the men listed as to their needs, dependents, etc. These lists were certified to the supervisor of the Monongahela National Forest who chose his men from this list. Whenever men failed to prove of worthy character on the job the supervisor immediately notified the relief agencies and were furnished readily with replacements so that the Forest Service received good returns on their money; the money so spent went into all communities and all six counties which are embraced within the forest area.

It is interesting to note in this connection that the six counties involved in the Monongahela National Forest contain 4,155 square miles with a total population of 100,000. There is no town within the area of over 2,000 population except Elkins, which has a population of 7,735. The average population for the area is 22 people per square mile. In the 1,867 persons employed two people came from the town of Elkins and four from the town of Parsons, leaving the other 1,861 to come from the submarginal farms of the area. The money so earned by these folks coming one from a family as they did, had its effect among some 11,000 people of the area, or approximately one-ninth of the population.

Compare for a moment if you will, the expenditure of the Forest Service of their $89,000 just cited with that of a state highway project of $62,000 made by our State Road Commission in an adjoining county. This money was spent on a project developed by contract which gave employment to only 30 men. The men used were brought in from another state by the contractor. Folks in the local communities did not derive the same benefits as those secured through the Forest Service expenditure.

Another example could be cited of a planting season which lasted for about 15 days' duration with 60 men working from a camp. The money so earned benefitted some 360 persons as a result. A check-up with a number of the men employed in the planting camp showed that the cash received was used for farm seed loans, doctor bills, taxes, and clothing bills. With these examples before us it seems that our cash income difficulty for these mountain folk had some assurity of becoming stabilized and recurrent through employment in the forest, so that the next

problem within the area would become the securing of decent agricultural land upon which the family's food supply could be produced.

Being sufficiently satisfied that additional forest lands would help support a larger and more permanent population it was gratifying to those in charge, on behalf of this program in West Virginia, to learn that the President set aside $20,000,000 for acquisition of additional forest lands. When the National Forest Reservation Commission met in August, 1933, they extended the purchase area of the Monongahela National Forest to include some 690,000 acres in West Virginia lying to the south of the present existing boundary. At the same time that this extension was made, sufficient agricultural land was included to warrant the creation of a subsistence farming unit. While the farm land for the subsistence unit is within the purchase area of the forest, the acquisition and its development is handled through the Subsistence Homestead Division of the Department of Interior. The work is being carried on locally under the direction of a board known as "Tygarts Valley Homesteads Incorporated" composed of a banker, county relief worker, forester, a representative of the Subsistence Homestead Division, and a lumberman.

With the extension of the Monongahela National Forest purchase boundary there will ultimately be a forest of approximately 1,600,000 acres surrounding the subsistence farming unit. Adjacent to it will be approximately an equal acreage made up of private woodland areas, hence the natural industrial development of wood-working including carving, painting, cabinet work, or similar handicraft. We know that the people do turn to these various lines of activities since they have been doing so since the cessation of many large timber operations in the region.

To take advantage of this it is necessary to seek the coöperation of the National Committee on Decentralization of Industry. It is a well known fact that many wood-working concerns in different parts of the country are now idle although financially solvent, due a great many times to the distance from consuming centers, coupled with high freight rates and the scarcity of their particular grade of material close at hand.

With these facts in mind it is logical to expect the relocation of these small factories through the coöperation of local business and civic leaders, in the immediate vicinity of other going factories, or relocation under contracts calling for the establishment of some private enterprises. Such relocations may be secured by special community inducements touching taxes, by the prospect of a stable labor supply for seasonal operations, or by direct federal subsidies to cover moving costs. In addition to the factory development each of these subsistence farming units will be equipped with organized development of the simpler handicrafts such as cobbling, pottery work, etc.

Through the subsistence farming unit program underway in West Virginia, forestry will play a vital and an ever expanding influence in the social and economic development of our forest areas.

BALLYHOO FOR BARK

By ERLE KAUFFMAN

Assistant Editor, American Forests

This article is extremely interesting as reflecting the viewpoint of a shrewd observer of the present forestry effort.—HENRY CLEPPER, *Associate Editor.*

"FORESTRY'S on the front page now!"

How often during the past year have I heard this! At first it came as a triumphant cry from that woefully small group of practitioners whose lot it is to promote conservation; but later it was taken up by butcher and baker and candlestick maker—people who in the past would stare in perplexity at the very mention of the word.

Just how many agate inches of type have been fed to the newsman's ink, I do not know and neither does any one else. But certainly no daily, weekly, or biweekly in the land has failed to blacken its front page with forestry. The same thing may be said about the editorial page. An eastern daily has produced sixty-one editorials of a forestry nature since February, 1933. Previous to that time it had carried none in three years. A great New York daily, noted for its conservative policies, became so infatuated with the word "reforestation" that an editorial under that title appeared in three consecutive issues.

Yes, forestry's good copy these days. Even the old family journals are giving it ink. Cartoonists everywhere are saying it with lines. Radio announcers have reached a certain intimacy with trees and the field.

And why? What has happened to our astute editors that they suddenly place a front page valuation on forestry matter? What magic has been spread over a nation of people accustomed to looking upon forestry as a scientific paradox or a vague sort of ideal for those of a sentimental turn of mind?

Is it that forestry is receiving its baptism of honest-to-God ballyhoo?

I sought confirmation from an editor—one of those gentlemen of the press whose hand is ever on the pulse of the national situation. "The obvious answer is circumstance," he replied. "In this astonishing day of social and economic transformation, the forests in a sense have become show windows. They are being spotlighted in the drama of the New Deal.

"Almost overnight a master salesman has transformed for the man on the street a vague, indefinite something called forestry into drama, human interest and fact. By doing so he has intrigued the people. I speak of the President of the United States."

I carried my question to a successful publicist. "I will not call it ballyhoo," he said wisely, and with a wink of his eye, "but it's the same magic. Forestry is on the front page today because it was put there by a master publicist—a man who can see and talk beyond the microscope and who knows the true relation of forest values to human values." He smiled. "You might consider, too, that that man is the President of the United States."

I knocked at the door of a famous Washington correspondent and radio commentator. "Forestry's not on the front page," he snapped after I had stated my mission. "It's the C.C.C., the T.V.A., the P.W.A., and more recently the Prairie Shelter Belt. The New Deal's on parade

not forestry."

I looked no farther. First an editor, then a publicist, and finally a political observer and commentator had qualified my opinion. Forestry was on the front page because it was a show window, because it was part and parcel of the New Deal, because it had the President of the United States behind it.

These viewpoints, of course, do not alter the benefits forestry may receive from its front page publicity. But they are significant. First of all, they leave little room to doubt that ballyhoo is essential to the success of any project needing unified public support; secondly, they emphasize the small regard with which foresters in general have held ballyhoo in the past; and finally they challenge the future of forestry without a well laid plan of constructive and specifiic ballyhoo.

The trouble with ballyhoo is that it has been widely misused. Too many shallow projects have ridden to heights on its crest, only to melt under the heat of the spotlight. Conservative minds, therefore, often refuse to see its magic for fear of being branded fake or failure.

Many of the ills with which foresters are confronted today are directly traceable to this sort of reckoning. The fear of over-stating over-dramatizing, of promising too much has resulted in conservative, if not timid, public relations policies. As a consequence, the public too often looks upon forestry as it would horse trading—one is never quite sure of what they're getting.

Even with the opportunity given it by the New Deal, forestry has been amazingly backward in its own ballyhoo. The result is that there are many people in the same quandary as a carpenter I recently ran across.

"Sure, I know forestry," he said, with a flash of pride. "I read the papers. And it's great business sending those kids out to the camps. It'll make real men out of them. But say, what the hell do they do with their time?"

Where does the trouble lie? First and foremost is the chaotic state of mind with which foresters in general view the application of ballyhoo to their work and their calling. Second, is the rather unique public relations procedure in forestry particularly in the federal units. In far too many cases the "press agent" responsible for its public contact is a soundly trained and efficient forester. He knows the product he is selling well enough, but the medium of ballyhoo, the art of "putting it over," is rightfully out of his ken. He succeeds to the same extent that a soundly trained and efficient press agent would succeed as a forester.

The first law of ballyhoo is to establish in the "language" of the street the thing that is been publicised. A builder has no sentiment about trees; but the production of good lumber is of vital interest to him. A tree lover sees only beauty; a fisherman's interest runs to water, and so on. The second law is to dramatize and humanize—and to keep on dramatizing and humanizing. The man in the street must be put into the picture; the ballyhoo must be for him and about him. It must give him something, or promise to give him something—must keep him in the spirit, in the hope, that he will get it, perhaps more. The third law of ballyhoo is concentration. Forces cannot be scattered. The same thing must be told over and over and over, so that its definition is understood and retained.

Foresters should be agreed on the matter that forms the ammunition for their ballyhoo guns. Nothing is more confusing to the man in the street than an "inner controversy—one authority saying "yes" another "no." Opinions vary, to be sure, and there will always be two sides to every question, but there are

proper mediums for their airing. No group, organization, or profession today is without an official magazine, paper, or bulletin, the function of which is to turn up angles for discussion and digestion. Ballyhoo is not the purpose here.

But ballyhoo is and must be the purpose of forestry when released for public consumption to the magic of the pressman's ink. Unless there be ballyhoo, its course is uncharted. It is left to the winds of chance and error.

If this had been recognized twenty-five years ago, I wonder if my friend, the Washington correspondent and political observer, could have said to me, "The New Deal's on parade, not forestry?" Had our sails been set, had the public been made aware of its land and tree opportunities, had forest values and human values been mated, perhaps my observee would have seen differently.

Perhaps he will before long. The day may not be far away when forestry will be on its own again—when its champion and publicist, the New Deal, will turn the spotlight across the stage to a new star. Then, perhaps, forestry will have found the magic of ballyhoo, and will bask in the gleam of a new sunrise wherein drama, human interest and fact ride along the golden beams. Unless it has discovered this magic by then, the day of "front page forestry" will become history—to some, a symbol of paradise lost.

By the middle of the seventeenth century woods and forests in France had come to be valued for their products, more than for the shelter which they afforded to game. But they were subjected to such devastation that one far-seeing statesman at last perceived that the existence of the nation in a state of vigour was being perilled by the destruction of the woods and forests, and he gave expression to his fears in the oft-quoted saying—*France perira faute des Bois*—France will perish through lack of woods.—*French Forest Ordinance of* 1669.

EXPERIENCE IN EXTENSION FORESTRY IN WURTTEMBERG, SOUTHERN GERMANY

By DR. K. DANNECKER

Translated by Charles F. Evans and A. O. Weidelich

How a German forester went after the individual forest owners to make them forest conscious and to get them to practice forest management. The article proves that there was no widespread concerted action insofar as practical forest management is concerned in the State of Wurttemberg prior to the World War. Dr. K. Danneker started the idea on a state-wide scope. He is not employed by the State, but gets his salary from the landowners.

THE primary task in this work was to awaken interest in orderly forest management. At the very beginning it became evident that there were forests where forest management had been practiced for generations. It was easy to teach the owners of these forests the finer points of management, such as care of seedlings, saplings, artificial reestablishment of hardwood species, which as a result of earlier cuttings were no longer present in the stands, and the establishment of more economical conditions for utilization through the construction and maintenance of forest roads.

On the other hand, however, we found the majority of forest owners, who although fully aware of the commercial value of the forested part of their property, were fully convinced that whatever they did, or rather neglected to do, was the only proper method to treat a forest. One can realize it was no small job to get these people away from their inherited ideas or wrong conceptions and habits. What was more natural to them than simply to copy the methods of others nearby? The idea that what is good for large, well managed forests also could be applied to one of smaller size was too much for the small owner to believe.

In relating experiences, one must select from a wide field only some of the most important phases. Let us consider then the problem of forest management in the farm forest. The farm owner is more or less dependent on himself. The thought that what was suitable in the management of large forest tracts might also be suitable for the farm forest woodland with its extremely varied conditions was far from his mind. It is a certainty that owners of small woodland are very often perplexed about forest care. This is by no means strange.

The demands on the forest during the past decades made several transformations necessary. Out of the one time pastured forests and where the farmer got litter to bed his stalls, developed the forests used only for fuel and out of that finally the timber bearing forest. This transition is not completed as yet in the smaller woodlots of today. Then there is the inherited unsatisfactory combination of species as well as the badly shaped, irregular small tracts.

For these reasons, it is no small wonder that even today we have a frightful conglomeration of methods in the treatment of the small owners' woodland.

Consider for a moment how the new forests have been established. Without taking into consideration soil or locality the seedlings have been planted. Little consideration has been given to the natural requirements of the various species. Very often intolerant species were planted under tolerant species or frost tender tolerant species in unprotected open spaces.

Moreover, pine or, if that would not do, spruce was planted where clear cutting had been practiced. I would like to mention expressly that with few exceptions too many trees were planted rather than vice versa, since in general our farmers do not lack good intentions toward their forests.

The worst condition, however, prevails in cultural work on the stands and in utilization. The conception prevails very widely that a stand which has not been touched in say 10 years will mature and be ready for harvesting earlier. One finds thickets in which the wood actually starts to rot, and yet right next to this a thriving stand is butchered by clear cutting. An intimate knowledge of tree life and the connection between soil and stand are lacking everywhere.

On top of this, few farm forest owners have the necessary knowledge to prepare timber for the market. In consequence of this, many owners in order to escape the difficulties simply sell their marketable timber to a buyer who invariably clearcuts the whole stand and it is very evident who is the gainer and who is the loser in such a transaction. However, in spite of this, there are always new victims. It would lead us too far astray to enumerate any more of the characteristics of typical farm forest management.

It must be clear what serious problems of a personal as well as a technical naturn had to be met and solved. One soon gained the impression that to make the farmer practice forest management was a problem in management itself. Anyone who believed that all he had to do was to march to the farmer's woodlot and make speeches about advanced forestry, etc., and expected such to be put into practice, would be greatly disappointed. The farmer thinks two or three times before he accepts anything which is strange and new to him, and then will try it only after it is all figured out for him and he is shown that he will be the gainer.

To go into individual cases with the various economic circumstances and taking into consideration the personal wishes of each owner involved in the variegated condition of the stands and the variety of species, required on the professional side adaptability and technical knowledge, and on the personal side great love for the forest. The job of advising the owners had to be planned and carried out carefully. Forest management was the goal.

The first and primary question to be considered was in which direction should the management work. To come to the right conclusion in this all important question, every opportunity at home as well as abroad was taken to study where climate as well as species are similar to home conditions and where successful forest management had been practiced.

Our observation showed us where the forest was handled on a selection basis the stands were in very good shape. On the other hand, wherever clear cutting had been practiced, the woods showed very unsatisfactory conditions. This observation gave us much food for thought. In the face of existing local conditions and other diverse circumstances, as well as the presence of many foreign species, one could not go dogmatically with a single plan into the forest. But the guiding thought of all proposals and measures could only be the adoption of those methods which were most suitable in the long run for farm forest management.

The work was started with comprehensive explanations by word of mouth and writings. The methods of clear cutting were condemned most severely and specific species were recommended to fill openings in the forest immediately. At the same time we asked the forest owner to practice selective cutting. Demonstrations were given and we figured out where one can harvest more timber by using selective cutting because the trees left will keep on growing. This activity, the cultural work in farm forests, opened up a com-

prehensive and a pleasant field of work.

To arouse interest in the forest and its requirements as well as in forest management, we chose such newspapers as would come to the attention of farmers and to which they were subscribers. We saw to it that each issue had an article about forestry and what we wanted to put across. We also had good success with articles in weekly papers as well as daily papers. It was very gratifying to notice that papers serving sections where forest predominates, very willingly accepted such articles and printed them. Early in the work a desire was manifested for a printed guide for the farmer in which he could find information about various problems. To comply with this request, I wrote "The Forest Manager (Der Waldwirt)" in 1926. With this small book I tried to satisfy, besides the farmer, also such people who had a general interest in forestry or forest owners.

Hand in hand with the written explanations went speeches at meetings. At first we used existing institutions such as meetings of county councils, etc. In these meetings the necessity of proper care of farm forests was awakened and the groundwork was laid for future progress in this all important work.

At first our meetings were attended very poorly and we were bitterly disappointed. However, after articles had appeared in the papers we soon had a larger attendance. The most successful methods were demonstrations and walks through the forest with the farm folks. In these meetings in the woods, we lectured about orderly forest management and there it was comparatively easy to point out striking examples such as use of various species to reestablish the forest, the bad effects of clear cutting, etc. It should be stated here that most farmers who attended these field meetings in the forest, very soon became forest minded. We then reported on these meetings to all newspapers which we knew were read by the same folks as well as their neighbors. In these walks we could point out to the interested men the individual needs of the various stands and thereby were able to be very specific in our instructions. Of course, it was obviously desirable to start these individual teachings in those localities where the most interest was manifested. Those farmers who subscribed to trade papers were the first to respond. It was gratifying to notice that advice given there was taken quickly.

It would not have been worth while to force advice where it was not wanted or where the forest was entirely secondary to some other business. The individual advice extended to making management plans and estimates to ascertain value for selling or trading, and advice on values for taxation purposes. We need only remark secondarily that everywhere that estimates are made and timber is cut, the results of the cutting should be recorded. Generally the advice and assistance to owners included the designation of trees to be cut.

It was an easy matter to select from among these forest tracts whose owners had been given continuous advice, individual cases where the forests, because of composition of the stand and because of the local situation, were particularly suited for examples of forest management. Such demonstration areas exist in a number of districts. After these areas have had expert treatment for a number of years, they should serve for the instruction of the farm forest owners in the surrounding locality. In the more heavily forested districts, it has proved advisable to arrange a considerable number of such demonstration areas in order to be able to show the forest farmers methods of management suitable for various conditions.

The next step is the giving of prizes for model cases of forest management. Prizes undoubtedly stimulate many farm forest owners to good future forest management. An observation period for a

forest industry of at least five years, if not ten years, is required in order to justify classing it as eligible for a prize as a model case of management. During the last few years while on demonstration trips, or when giving individual advice, the forests eligible for prizes are noted and recorded.

The whole job of improving farm forest management must rest on a solid foundation. The strength of the adviser will soon give out unless there can be found leading men among the forest owners in the various forest districts who are ready to coöperate and keep the interest alive through continuous personal participation. Thousands are waiting for advice and it was therefore necessary to plan on the organization of forest owners. Progress along this line to date is satisfactory. There are now district organizations in all the main districts which contain much farm forest land.

The forest organizations serve to some extent as local district councils. They are the connecting link between the chief advisory office and the forest owners. Regular requests from the owners for individual advice go to the local organization. They assist in arranging meetings, lectures and demonstration trips. The organizations are the keynote to success in improving farm forest management since in the long run they cannot limit themselves to the production of timber but must concern themselves with the problems of timber marketing. The beginning made along the latter line by several associations is promising. It is of the greatest importance to keep alive the activity of the forest associations and to continually encourage them since the difficulties they have to overcome are by no means slight.

The need for forestry advice among the farm forest owners developed gradually in a zonewise fashion. It was therefore possible with the means at hand to do justice to all requests received. In the districts where associations exist it was natural to turn over to them the rôle of supplying information and instruction.

Planwise educational work and the good example of individuals finally brings the farm forest owner to the point where generally he requests advice. This method seems better suited to the farm forest than a policy of enforcing organization from above.

Yet, after all, it must be clear in the very beginning that the fruits of such work will ripen only after the elapse of decades. When a Brandenburg farm estate owner, who is at the head of a large forest association, says, "It required 400 years of association effort to bring the teachings of modern agriculture and the knowledge of artificial fertilizer to the fireside of the last owner," then one can say, in view of the much longer production period in forestry, that it will require at least as long a time before the science of orderly forest management will have been established.

FOREST MANAGEMENT AND UTILIZATION IN THE UNION OF SOVIET REPUBLICS

By N. A. LUTOVSKY

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Russia, from whence come so many contradictory stories, supplies the JOURNAL with this official version of Soviet forestry. It is interesting, timely, and enthusiastic in its acclaim of worthwhile forestry achievements and of even greater future plans for the U. S. S. R.
P. A. HERBERT, *Associate Editor*

CLOSE to a milliard hectars of land (exactly 949 million hectars) in the U. S. S. R. are under the jurisdiction of the division of forest management. The area which is actually in forest makes up less than one-half of the above mentioned total and, in accordance with the latest data, occupies 453 million of hectars.

However, even this area exceeds to a considerable extent that in some of the countries which have large areas in forests, such as Canada, U. S. A., and others. For every man in U. S. S. R. there is an average of about three hectars of forest, while in the whole world the average is approximately about 1 hectar per man. On the basis of percentage, the forest cover in Soviet Union is behind some of the European countries such as Finland, Sweden and others, which have a much smaller area under forests. The average percentage of forest cover in U. S. S. R., equals approximately that of the United States (twenty-eight per cent).

All forests of Soviet Union, without any exception, belong to the state and form a unified state forest organization. Under the present laws forests, as well as lands, cannot belong to private persons. Such public ownership and the unified state forest organization provide great possibilities for forest management in accordance with definite plans and permits the use of the forests in accordance with the requirements of socialistic principles.

The Soviet forest administration is divided into forests of state importance and forests of local importance. The general area under the latter is 50 million of hectars, including over 30 million of hectars of forested area which is mainly reserved for the needs of local (mostly farming) population. These forests are located in regions most convenient for the population and are under the management of local authorities, which in their turn are under the Peoples Commissariate of Agriculture.

In the forests of Soviet Union there grows a great variety of conifers and broadleaved species. The conifers, such as pine, spruce, larch and cedar occupy the largest area while the most widely spread broadleaved species are the birch and aspen. In the southern half of the European part of the country and in the far east rather extensive areas are covered with oak. In Caucasus, among many valuable species Buxux sempervirens is found which is known as an extremely strong and very valuable wood. In the forests of the middle Asia Soviet Republics there are many thousands of hectars under walnut, Pistachio, almond and other fruit bearing trees.

Completely satisfying the needs for lumber and other forest products for the

Soviet's plans is the problem of forest management in the Soviet Union. The volume of forest resources and the technical properties of the growing trees and shrubs can easily take care of all these needs, leaving a considerable surplus which has enabled the Soviet's to increase its export of lumber abroad. Nevertheless, in a considerable portion of Soviet forests the cut is still too small owing to the great distances that separate these forests from the densely populated and industrially developed parts of the country.

Therefore, the task of the Soviet forest industry is to develop consecutively the logging operations in the extensive forests of the northern regions, Siberia and Far East. This is closely connected with construction of roads, building of wood manufacturing industries, colonizing of the sparsely populated regions, and proper equipment for logging and transporting lumber. All measures which are taken in this direction permit the yearly increase of forests under management.

At present there are a number of new wood manufacturing industries in the Ural, at Pechora and in the Far East; besides, large wood manufacturing plants have been built even beyond the Polar Circle, on the river Enissei, which are preparing lumber for export.

The logging, milling and different chemical treatment of wood is also accomplished by state organizations under the division of forest management. Occasionally some of the other state and social organizations coöperate in these operations, working under an agreement and under the supervision of the division of forest management. Under such conditions the competition in hiring a labor force is eliminated, the laborers being hired in an organized manner; besides, the possible difficulties in using roads and river drives, etc., are avoided.

Furthermore, as the above mentioned state organization dealing with forest management is fixed with the responsibility to supply the country with forest products, it must determine the place of wood in the economic program, the quantities and assortments required and must sign agreements with organizations to furnish them with forest materials.

Based on the requirements in forest materials of the different branches of the Soviet's planned program, the volume and location of the logging operations are determined. After this, either the Division of Forest Management, or in some cases the organization which consumes the forest materials, carries out the logging, knowing before hand the amount of every assortment to be prepared and the purpose for which the lumber is to be used.

The yearly increase in logging operations, the general lack of labor force and the desire to improve the hard, physical labor of workmen engaged in logging, as well as the reduction of the actual cost of production require more complete equipment for the work.

The government made it the duty of forest organizations to introduce improved mechanical implement for logging as well as for sawing, barking, splitting, transporting of logs from the site river driving, etc., and assigning to each the necessary funds. There are already in use hundreds of mechanical saws and lathes for cutting railroad ties and barking logs, as well as hundreds of tractors and various implements for loading and unloading lumber, tying it into rafts, etc.

Serious attention is being paid to the improvement of forest roads for transporting lumber; different skids, shoots and iceways have been arranged. Already in 1932 about 14 per cent of the

total lumber production was transported from the forests by improved and mechanized ways, and in 1934 in river driving there will be engaged 212 mechanical installations for tying lumber into rafts and 306 installations for unloading. If we take into account that to the beginning of the first five year plan (before 1928), the Soviet forest industry almost had no mechanical equipment for logging and river driving, we must admit that at present it is considerably better equipped. But, of course, this is only the beginning of the technical reconstruction which, in accordance with the Second Five Year Plan will be further developed so that in 1937 all the main and most labor requiring operations in the forest will be accomplished by means of mechanical equipment. The lack of the latter makes it necessary to increase the production of forest machinery and implements by assigning some of the existing plants for its production and by building new plants for the same purpose.

The total scale of logging operations accomplished by the division of forest management in 1929 was determined as 85 millions of cubic meters, in 1933 and 161 mill. cu. m., while during the last year of the current Five Year Plan the logging is expected to be brought to 500 million cu. meters. For the convenience of mechanized logging operations the operations in the extensive forests are in large and concentrated areas. Such concentrated operations also prolongs the period of logging and affords the possibility of carrying these on during the whole year.

Together with the development of logging operations proceeds the broad development of wood manufacturing at the mills. The gross production of wood manufacturing industries in unchangeable prices of 1926-27 has raised from 513 million roubles in 1928 to 1,270 millions of roubles in 1932, which makes an increase of 147 per cent; during the same period the lumber sawed increased from 13.6 million cu. meters to 24.4 million cu. meters. In the milling industry there are over 2,800 sawing frames in use; a considerable number of these was installed during the First Five Year Plan (1928-1932). The available sawing equipment, together with the plants which are to be built in near future are expected to provide in 1937 43 million cu. meters of sawed lumber, that is 76 per cent more than in 1932. At the beginning of 1933 the capital of the wood manufacturing industry was estimated, in accordance with the renewal costs, as 519 million roubles as compared to 212 million roubles at the beginning of 1928, an increase of 144 per cent.

The production of other wood manufacturing plants producing casings, veneer, wooden pipes, furniture, etc., was similarly accelerated. For instance, the manufacturing of veneer during the First Five Year Plan increased from 185,000

Fig. 1.– Digging of an ameliorative ditch on the willow plantation.

cu. m. to 424,000 cu. m., per annum, or an increase of 129 per cent.

Buildings are being erected to house large, combined industries for the purpose of a more complete utilization of raw material supplied to the plant. At the beginning of the First Five Year Plan most of the sawing mills were equipped with 1 or 2 sawing frames. At present, 65 per cent of all the mills built during the Five Year Plan have over 4 sawing frames.

The Soviet wood manufacturing industry introduces all possible rationalization in the industrial processes; kiln drying which is widely used in U. S. A., is being introduced here as well as the treatment of lumber with anticeptics, etc. Prior to 1932 only about 3 per cent of sawed material was kiln dryed while at the end of the current Five Year Plan it is expected to dry in kilns from 60 to 70 per cent of the total sawed lumber produced. Until recently the chemical treatment of wood was not well developed in U. S. S. R. During recent years this problem received much attention and already during the First Five Year Plan the gross cost of the chemical wood manufacturing industries has raised from 36 million of roubles to 100 million of roubles, almost a three fold increase.

The area of pine stands used for tapping is being increased from year to year. In this work is engaged a number of chemical wood manufacturing plants which produce artificial silk, etc. The paper industry is closely coördinated with the division of forest management. Paper production on the basis of value has increased in the last five years by 73 per cent, from 165 million of roubles to 286 million of roubles. The newly built paper manufacturing plants insure an increase in the output of different kinds of paper, including high grade paper.

The total value of the wood manufacturing industry in 1933 on the basis of the cost of production was 1908 million of roubles (by prices of 1926-27). In the current year, according to the plan, it has been decided that the output will be valued at 2,256 million of roubles.

The way is now clear for the speedy development of forest industry. An ample sum has been assigned to the industry for capital investment in the current Five Year Plan, and so there is a great possibility of raising this recently backward branch in the People's Economy to a high technical level so that it will meet all that is demanded of it. The application of introduced standards for raw material and the wider use of such standards for ready made articles which we see in the wood manufacturing industry of U. S. A., will accelerate the successful development of the forest industry in the U. S. S. R.

It has already been mentioned that in the Soviet Union the distribution of lumber is made in accordance with a certain plan. Consumers of lumber, state and social organizations, pay for it the prices established by special governmental organizations. There is a priority list for the delivery of wood for private uses of the working population. This list is prepared by the supreme Soviet District Organization and is determined in accordance with the density of forest cover in given locality and its climatic conditions. The law also foresees cases when wood must be delivered at lower prices than those that are fixed or even free of charge.

The Soviet Union has a considerable surplus of wood, cutting during the last years of the maximum development of logging operations not more than a half of the annual yield. This makes it pos-

sible to export a considerable quantity of lumber to foreign markets.

The Soviet State Exporting Organizations (all foreign trade of the Soviet Union is a monopoly of the state) export lumber to many European countries and to many other countries of the world. Export of lumber occupies an important place in Soviet foreign trade and already in 1927-28 it reached 96 million roubles, which made up 12 per cent of the total Soviet export. During the following two years the export of Soviet lumber increased considerably, but later it decreased as a result of the crisis in the capitalistic countries which had a great effect upon the international lumber trade. Thus, the full exporting possibilities of Soviet Union were not realized owing to the outside causes.

A large portion of the Soviet forests is either crossed by railroads or by waterways which connect them with open seas. The Soviet Union has especially good possibilities for the development of lumber export in the Far East where there are good connections to the markets of the Pacific Ocean. Many million of hectars of high grade forests are located in the drainage of Amour River and in regions intersected by the railroad going West to Khabarovsk and further to Vladivostok where there is a splendid port.

Considerable capital has been invested by the Soviet Government in this remote part of the country for its industrial development, special attention being paid to the development of forest industry. A number of newly built plants and some reconstructed old wood manufacturing plants prepare different products both for use within the region and for export.

While in the historical development the forest and wood manufacturing industry of U. S. A., moved from East to West, the forest industry of Soviet Union steadily moves to the East; the industry is absorbing forests in Siberia and Far East that formerly were practically unused. Thus, the two great Republics: U. S. S. R., and U. S. A., in respect to their forest management are as if moving one towards the other and it seems that a more close contact in lumber trade between these two countries would serve to their mutual benefit.

Placing as the main object in forest management that of meeting the requirements for forest products within the country and for export, the Soviet Government pays serious attention to the proper organization and management of the forest. Hundreds of highly qualified specialists are investigating the little used forests; the civil aviation takes part by photographing from the air and in cruising vast forest areas; improvement of waterways and roads in the forest for horse and automobile traffic is underway; work is also going on to determine the yield of standing forests to improve their condition and productivity; aviation participates in the protection of forests against insect and fungi diseases and against fire. Thus, in 1934 it is expected to organize an airplane control over 25 millions of hectars of forested area in the sparsely populated districts.

Fig. 2.—Clearing space for future willow plantation.

The Soviet forests are being raised to a higher level of cultural development by the ever increasing application of these measures to the forest.

Although demanding from the division of forest management that it supply the wood requirements of the country, the Soviet Government at the same time has set a limit on the use of forests which are of a special importance. Under this ruling are included the forested areas which have a favorable effect on water conservation ("water conserving forests") and forests that hold loose sand, prevent landslips, breaking off of the rocks, washing the soil, etc., (the so-called "protecting forests").

During the last years the question of the importance of water conservation and protection has been fully recognized in Soviet Union. The wooded areas in regions with sparse forests where periodically droughts occur, are considered to be one of the most important means for securing permanent crops in agriculture. Because of the importance of forests in these regions, the government has designated a considerable part of the country as a special zone which is called "The Zone of Importance of Forest Cultivation." All of the southern part of the Union is included therein, beginning in the western part with the Ukrainen Soviet Republic and ending in the east with the Middle Asia Republics, the Kozack Republic and Kighizia.

This zone of importance of forest cultivation makes up about a quarter of the whole territory of the Soviet Union and therein live more than a half of the population, whereas only about one-tenth of the forests of state importance are found there. Here too, are found the main farming districts as well as many industrial centers that were built before and after the Revolution, especially during the last years.

Annual cutting in forests located within the zone of importance of forest culture is permitted but not to exceed the annual growth. The government plan foresees a considerable increase in the space occupied by forests. The magnitude of the forest propagation plan may be seen from the fact that during the current Five Year Plan about 5 million hectars are to be planted. This exceeds many times the forest planting in the territory of Soviet Union during previous years, as during the previous Five Year Plan only about 500,000 hectars were planted.

In the plans for artificial forest planting shelterbelts occupy a prominent place. Observations of the agricultural crops on land adjoining such windbreaks has resulted in the opinion that they should be used liberally. At the Seventeenth Congress of the All Union Communist Party in January 1934, the Leader of the C. P. S. U., Comrade Stalin, said: "Planting of forests and shelterbelts in the Eastern regions of Zavolojie is of great importance. This work, as it is known, is already being done, although one cannot say that it is being done with sufficient intensivity." This instruction of the leader serves as a new stimulus for the future development of shelterbelt planting.

The voluntary association of small and odd farmers into large collective farms has resulted in considerable improvement in the economic status of the peasantry. It also provides the most feasible means of locating shelterbelts and in stimulating the interest of population in making investments in planting such shelterbelts.

For conserving forests which have an importance for water conservation cutting is limited to overmature and dead-wood in the strips one kilometer wide along middle and lower parts of the Volga, Don, Dnieper and Ural Rivers.

In addition, measures are taken to strengthen the banks of streams by forest planting there as well as in the gullies. These projects all appear in the current Five Year Plan and the work is being executed year by year in accordance with the annual allotments fixed by the same plan.

The limited logging within the zone of importance of forest cultivation makes it necessary to shift the logging and milling of many million cubic meters of wood to the more northern regions. This shifting of logging operations because of rationalized planning is accomplished without considerable difficulty as all the forests belong to the state and the location and volume of logging operations are centralized; thus, the only problem is to develop logging operations in more remote forests for which purpose the State supplies the necessary funds.

In addition to large scale forestation the Soviet forest management is attempting to improve forest stands by means of introducing new, rapidly growing and technically valuable species. Many species growing in the southern latitudes of the Soviet Union are successfully moved to more northern regions, the eastern species are moved to the west, etc. Besides this serious attention is paid to the cultivation of foreign species, especially those from U. S. A. Seed exchange with American and other foreign firms is being developed and at present permits the organization of broad experimental work on the propagation of exotic species. The successful results of these experiments give assurance that in the near future the propagation of foreign tree and shrub species will be extensively carried out in U. S. S. R., and Soviet forest management division will become an important consumer of imported seeds and planting stock.

The general management of the forests of the mechanical and chemical wood manufacturing industry is accomplished in U. S. S. R. by several central organizations. The largest of these organizations is the Peoples Commissariate of Forest Industry, under whose jurisdiction are up to 400 million of hectars of forested area and most of the wood manufacturing plants. The forests in the zone of importance of forest cultivation are under the Peoples Commissariate of Agriculture. Railroad transport and heavy industry also have at their disposal special forested areas assigned for their industrial needs.

Responsibility for forest management and wood utilization in the several forested regions rests with special Soviet forest unions or forest industrial management organizations which are organized to take care of forest protection, propagation, control of insects, diseases, logging operations, etc. The Soviet forest unions are much larger than the industrial management organization and are called in Soviet Union "Factories of Lumber." They are factories both in respect to preparation of lumber and raising of the forest. In the forest and in the forest industries very serious attention is being paid to the organization of labor force. The forestry organizations engage the necessary labor force by means of agreements with collective farms, taking steps to secure a labor force of permanent workers. At present the forestry organizations employ many thousands of workmen who live together with their families in the specially built houses.

All the workmen engaged in forestry have an 8 hour working day and received wages in accordance with the work done, according to the collective agreement of the forestry organizations with the corresponding organization of trade unions. In case the length of the working day

has to be increased, the overtime is paid by increased wages. The living conditions of forest workers are improving; this may be judged by the average wages which from 1929 to 1933 were increased by 77 per cent.

Decrees prohibit the use in heavy work on the forest of pregnant and nursing women and underage youths (to the age of 18). The forest administration is obliged to provide the workmen with lodging, bath houses, food supply, to organize social facilities, and to give cultural, educational, and medical service.

The Soviet forest administration has made much progress since the pre-war days when the workmen spent the few hours of rest in forest barracks in smoke and soot, and slept on plank beds full of parasites. The living conditions of a forest worker approaches those of workers living in towns. The food supply of men is provided by special divisions of the forest administration called Departments of Workers Supply. These receive food stuff from governmental organizations of supply and in addition carry on farming for the purpose of growing their own cereals, vegetables, dairy products, meat, etc. Besides this, measures are being taken to stimulate growing of vegetables by workers themselves, providing for this purpose land suitable for truck gardening free of charge located close to their dwellings.

Every worker engaged in forestry after 11 months of work receives in addition to the normal weekly day off a monthly vacation during which he is paid his full wages. After three years of work he receives an additional monthly vacation. All forest workers are insured by the state and in case of sickness, personal injury etc., receive compensation from the social insurance fund.

The forest workers, as rightful members of Soviet society participate in social meetings of their industry where the plan of the work is being discussed, as well as different questions of organization; they can voice their opinion and make suggestions for the improvement of the work and of their living conditions. Bonuses are given for valuable suggestions on the rationalization of the work.

Among the forest workers social competition is being broadly developed, the purpose being to increase the productivity of labor and to improve the quality of the product. The best workers receive the honorable name of "Udarnik" which entitles them to the right of priority in the Houses of Rest and Sanatoriums, to receive better supply, etc. In general, the work of the forest worker, as of the whole working class, becomes more and more a deed of honor, glory, valor and heroism, which is resulting in an improved economic status and better living conditions.

In spite of the marked achievements in Soviet forest management during recent years, full use is not being made of all the sources of raw material, nor have the requirements of rational management been fully met. There are many, very important questions of management which still require a scientific basis and special investigation. For this purpose there is a number of scientific-research organizations-institutes, experiment stations, laboratories and experimental grounds. The extensive scientific research work in the U. S. S. R., receives its funds from the state, organizing experiments, observations and investigations according to the plans developed with the aid of the field organizations. The useful results obtained by these research organizations are passed on to the forest administrative organizations which apply them in practice.

Under Soviet management, field organizations do not compete with one another but coöperate for the common good as set forth in the national plans. Thus, successful improvements both in organization and technique are not concealed, but by means of periodicals become generally known. In general exchange of experience is one of the important tasks of all Soviet industrial and field organizations. Both the research and administrative organizations are greatly interested in foreign experience and in their turn inform foreign groups of the results they have achieved.

The success of forest management may be explained to a considerable extent by the fact that there has been an increase in the number of young engineering and technical foresters educated in the Soviet universities and special technical schools. In accordance with the various needs of forest management the educational institutions prepare foresters and technicians of different specialties: on logging, transporting, cultivation of forest, milling, wood preservation, pulp manufacture, etc. Besides, the Soviet specialists, there is a number of foreign engineers, technicians and workers successfully in the forest managements of U. S. S. R.

For the purpose of raising the technical level of forestry work, different courses are offered which are attended by the working masses. At these courses the workers receive special education and on graduating occupy more responsible positions. In this work the voluntary societies, such as the Society for Mastering Technique and others, provide considerable assistance to the state.

In conclusion it should be mentioned that the Soviet forest economy as an unseparable part of the Peoples Economy is regulated by general plans of the Peoples Economy and does not suffer from crisis in its work as it develops in accordance with the interests of Soviet building. If at present the Soviet forestry is somewhat backward as compared to some other branches of Peoples Economy, this backwardness no doubt will be eliminated by mutual efforts of hundreds of thousands of workers, employees, engineering and technical personnel that give their efforts to the Soviet forestry.

THE COMMERCIAL IMPORTANCE AND USE OF NATIVE HARDWOOD SPECIES

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Most of the wood-using industries depend on hardwoods more than softwoods. These industries, when viewed from the value of the product, are a great asset of many states. Changing markets have played and will play an important part with species used. Specific industries, species, quantities of wood used and markets are cited to emphasize these statements. These facts should be reflected back in a consideration of the species to be encouraged in a planting or management program.

WITH the enlarged land acquisition and planting programs that many of the eastern states are undertaking or soon will undertake, the question of what species to plant should call for careful thought and study. Most of the planting thus far has been with softwoods and for some very obvious reasons, but it is apparent to some foresters that hardwoods should be given much more consideration than in the past. After all, timber is grown to be used. What then will be the future market for hardwoods and what will be their place in stabilizing the important wood-using industries. Stable industries mean dependable markets which in turn permit of sounder economic forest practice. This paper is devoted primarily to the hardwood markets in New York State but it should furnish ideas and comparisons worthy of consideration in much of the region east of the Mississippi River and particularly in the central and northeastern states.

Before confining this subject to New York State, it will be well to look at this problem nationally. Of all the saw timber in the United States consisting of 1,668,000,000,000 board feet, only 11 per cent is hardwood, and of this 11 per cent oak, beech, birch and maple comprise more than one-half. Of our total lumber production, hardwoods have supplied the following amounts: 1899, 25 per cent; 1909, 22 per cent; 1919, 21 per cent; and 1929, 19 per cent. These figures indicate that in so far as saw timber is concerned, we are cutting our capital stock of hardwoods about twice as fast as our softwoods. We are told, however, that the annual growth of timber in the United States on saw timber and cordwood areas is 7,040,000,000 cubic feet and that of this amount hardwood comprises 3,215,000,000 cubic feet or 45 per cent. The U. S. Forest Service reports for 1929 the average value of softwood stumpage in the United States at $3.76 per M and hardwood stumpage at $7.99, or 112 per cent greater than for softwood. During the same year, however, the mill value of hardwood lumber was only 56 per cent greater than for softwood. Since 1893 the average mill value and sale values of hardwood lumber of all kinds have been about one-third higher than for softwood. Other interesting and widely varying changes are to be found in our total national lumber consumption which declined 15 per cent from 1912 to 1928. During this same period direct lumber construction declined 22 per cent, factory uses declined 8 per cent and sash door and millwork increased 32 per cent. These three broad uses of lumber include our total national lumber consumption.

These few figures on stand, cut, growth, value and use might be used to prove or disprove several theories when projected into the future. It seems therefore that in a short article on this subject the simplest and most practical approach will be only from the use and value standpoint.

In 1928 the total national and state native hardwood lumber consumption was as given in Table 1.

TABLE 1

NATIVE HARDWOOD LUMBER CONSUMPTION, 1928

	National lumber M.b.f.	N.Y.State lumber M.b.f.
1. Furniture and chairs	1,169,080	86,037
2. Boxes and crates	911,367	21,229
3. Planing mill products	957,629	26,826
4. Automobiles	724,393	48,715
5. Sash doors & millwork	498,081	55,206
All other wood-using industries	948,522	91,904
	5,209,072— 75 per cent	329,917
Construction[1]	1,688,928— 25 per cent	109,972
	6,898,000—100 per cent	439,889

[1]State figures are not available for this item so the national percentage has been assumed.

Note that seventy-five per cent of our hardwood lumber is used by the industries and 25 per cent goes into construction. In the 42 classes of wood-using industries in New York State, hardwoods exceed the amount of softwoods in all but 11 classes.

It has been shown that most of the hardwood lumber is used in the wood-using industries while softwoods are used chiefly in construction. Construction used 63 per cent of our national lumber cut in 1928 and of this amount, only 4 per cent was hardwood. This figure may indicate that about the same relative figure would hold true for New York and many other states.

Woods going into construction are softwoods cut at a sawmill. At this point they are generally run through a planer or other machine and then usually find their way to the retail yards and into the house, office, hotel, factory, or rough construction jobs. Comparatively little labor has been put into this piece of softwood and comparatively little money has been left behind to make business. This sawmill soon cuts out the softwood and moves on. Compare this to the hardwood mill industry and its ally, the wood-using industry. This hardwood must be carefully dried, fabricated, assembled and finished. These are processes that involve much more labor and money than those of softwoods for construction. It is desirable, therefore, for a state to have hardwoods, the woods of industry, the woods that make more business and greater stability of industry. We should not be greatly interested in the industry that cuts out and gets out.

Census figures give us some interesting information on the value of the product for the *leading* hardwood wood-using industries in New York State for 1929. These industries (Table 2) use nearly 100 per cent hardwood.

TABLE 2

HARDWOOD WOOD-USING INDUSTRIES

Industry	Value of product	National rank of N. Y. State
Wooden furniture	$136,000,000.00	1
Wood turnings and goods	8,700,000.00	1
Wooden caskets & coffins (66 per cent hards.)	6,300,000.00	3
Mirror & picture frames	5,180,000.00	2
Wood distillation and charcoal	4,866,000.00	2
Refrigerators (non-mechanical, 80 per cent hards.)	4,840,000.00	4
Cooperage	4,750,000.00	3
Wood lasts and heels	2,163,000.00	2
Wagons and sleds	1,170,000.00	3
Pool tables and bowling alleys	824,000.00	1
Excelsior	252,000.00	4
	$175,045,000.00	

Compare $175,000,000.00, the value of the products of eleven leading indus-

tries using hardwood primarily, with the value of lumber f.o.b. mill for the same year in New York State—sawmill products, both hardwood and softwood—which is about $7,000,000.00. The sawmill industry, comparatively speaking, is not important. The industry that takes this lumber or wood and puts a considerable amount of labor on it is the one that is more important. The industry that takes a little medium priced lumber and makes a table, radio cabinet, etc. worth several times as much is something for foresters to think about. If forestry and foresters are going to progress on a sound basis, they must do much more thinking about the ultimate use of the crop.

The following industries in New York use hardwood chiefly and they receive most of their wood from this state. This list will answer in part the oft repeated question, "What are the outlets for state-grown hardwoods?" The list is arranged in order with the principal hardwoods.

Boot and shoe findings—practically all maple with a little basswood, beech and birch.

Woodenware and novelties — maple, birch, beech and basswood.

Baskets and fruit packages—maple, beech, elm, birch and basswood.

Agricultural implements—maple, birch, beech, yellow poplar, basswood and oak.

Handles—birch, beech and maple and smaller amounts of ash and hickory. These five industries used over 50 million feet of lumber in 1926.

Brushes—nearly one-half being birch with lesser amounts of beech, maple, basswood and black walnut.

Shuttles, spools and bobbins—maple and birch.

Dairymen's poulterer's and apiarists' supplies—maple, beech, elm and basswood.

Machine construction—beech, maple, oak and basswood.

Sporting and athletic goods—maple chiefly with smaller amounts of basswood, yellow poplar, ash and elm.

The leading hardwoods in all of the wood-using industries in New York in order are shown in Table 3. (Note that practically all of them are typically state woods.) This table shows again the position and potential importance of state grown hardwoods.

TABLE 3

LEADING HARDWOODS

	Amount used by N. Y. industries in 1928 Board feet	Lumber cut in New York in 1928 Board feet
[1]Maple	67,000,000	29,000,000
[1]Red gum	61,000,000	
Oak	55,000,000	9,000,000
[1]Yellow poplar	54,000,000	
Birch	35,000,000	21,000,000
Beech	23,000,000	18,000,000
Basswood	22,000,000	5,000,000
Chestnut	22,000,000	3,000,000
Black walnut	14,000,000	not reported
Ash	12,000,000	2,000,000
Elm	8,000,000	2,000,000
Black cherry	2,000,000	not reported
Total	260,000,000	89,000,000

[1]Not added in the total as they are not typical state woods.

Of the important New York State hardwoods, viz. maple, oak, birch, beech, basswood, chestnut, ash and elm, comprising 90 per cent of the state's hardwood lumber cut, the woodlands of the state supply only about 30 per cent as much as is used by the wood-using industry alone. The balance comes from the Appalachians, the Central States, the Lake States, the South and Canada. The hardwood lumber freight bill of New York State in 1924 was $6,726,773.00. It is evident that there is a market for the native hardwood within the state.

Thus far the topic has been chiefly

about lumber but there are many other important uses, particularly for hardwoods. In terms of cubic feet, the national hardwood lumber consumption is 1,702,672,000 feet or 23 per cent of all lumber, but when considering all forms of wood used in terms of cubic feet, the total hardwood consumption is 5,811,-422,000 feet or 40 per cent of the total. Thus, while hardwood lumber comprises only 23 per cent, in all wood uses hardwood has reached the surprising total of 40 per cent. Items in which hardwood volume *exceeds* softwood nationally are: fuel, hewed ties, fence posts, round mine timbers, veneer logs, slack cooperage and hoops, logs and bolts in manufacture, tight staves and heading, distillation, tanning extract, and excelsior wood. The only items in which softwoods exceed in addition to sawn timbers, structural dimension stock, lumber, are: pulpwood, slack heading, shingles, export logs and hewn timbers, poles and piling.

Of these various important minor products in addition to lumber, New York State has an important place in fuelwood, posts and stakes, pulpwood, mine timbers, veneer logs, logs and bolts in manufacture, distillation wood, piling and excelsior wood, and practically all of the wood in these products is hardwood except that of pulp. In other words, New York State is depending on native hardwood to supply all of the important industries except pulpwood. This is truly a hardwood using state. Foresters should not lose sight of this fact in providing for the future wood supply.

One may wonder what the situation will be fifty years from now. It seems that the best basis for judgment is that of past and present conditions. Here are these established industries needing these woods. Most of them will likely remain if their raw material is to be available unless workmen's compensation rates and taxes drive them out. This is another situation about which foresters might take an interest, since it is an economic problem bearing directly on forestry practice.

With the variety of good hardwood species that reproduce and grow well in New York and with a well diversified hardwood industry established, with skilled labor, good water, rail and truck transportation and the best of markets in this country, it is questionable if the two most important hardwood producing regions, viz., the Southern Appalachians and the Lower Mississippi can seriously compete in the future with the hardwoods here at home.

During the past seventy-five years there have been some important changes affecting New York hardwoods. About seventy-five years ago there was a very great demand for hardwood from the vicinity of Albany north to Canada and thence east toward Malone to be used in local iron smelting. It is said that many even aged hardwood stands of today in this region date from those heavy cuttings. Until twenty-five years ago there were perhaps eighty brickyards along the Hudson River that used thousands of cords of hardwood fuel in firing brick kilns. The countryside for miles was clear cut for this valued product, and as it became scarce and high priced, other material was used for firing, until today only two or three brick companies are using wood. Fuelwood today offers a very important outlet for thinnings, tops and defective material, and is seldom given the prominence that it deserves. From our national standpoint fuelwood, prior to the depression, accounted for twenty-eight per cent of the annual wood cut, lumber included, and this year it is much higher. More fuelwood in homes is being used today in this state and in many

states than anytime during the past fifty years because it is cheap, accessible and suitable. Nearly every hedgerow, woodlot and timber tract is being called upon to supply the great demand that the depression has developed. New York is an important fuelwood consuming state and this wood is nearly all hardwood. The chestnut blight has killed one of the best hardwoods, valued not only for its lumber but especially adapted for poles, posts, stakes, tannic extract and other important uses. Gum and other logs from points south along the Atlantic are threatening to enter this state along the Barge Canal system for basket manufacture and possibly other uses in competition with other species.

Continual change, as I have just indicated, makes useless species of yesterday valuable today and likewise eliminates markets for other species. With this in mind, the consideration should be not only of the past and present demand but particularly the rate of growth, form, freedom from enemies and disease, maximum economic size, and particularly the properties and quality of the wood. Some fast-growing woods reach merchantable size much quicker than others. Some woods are in demand in smaller sized trees for handles, posts or props. Woods which because of their properties have a wide variety of uses, not only for lumber but the many other products, are the ones for primary consideration.

This is a woodland state of many small owners. Since it will be many years before the farmer or small woodland owner will be able to convert his timber into lumber to advantage, he will do much better to dispose of his timber in such rough forms as stumpage, logs, bolts, props, posts, stakes, poles, piles, pulp, fuel and distillation wood. Most of these outlets call for hardwoods rather than softwoods, and thus the woodland owner with hardwoods has a wider variety of outlets from which to choose and a better opportunity for profit. This is a very important point in many of the woodland states.

The outlets for hardwood thinnings in New York are as follows: fuelwood, distillation wood, posts, stakes, hop poles, mine ties, and some small dimension stock. Larger thinnings may in addition be used for railroad ties, small poles and piles, mine props, and bolts for such products as spools, shoe heels, brush blocks, handles, some athletic goods, woodenware, toys, novelties and crating. Preservative treatment may bring into use several woods not now used. Some of the above outlets can use tops, limbs and defective parts as well as thinnings and small trees. The amount of hardwood used in some of these industries particularly fuel, distillation, posts, ties and props is very large. The crating industry in 1928 used over eleven million feet of native hardwood species, chiefly beech, birch and maple. This is a splendid outlet for this low grade material.

The small dimension stock field is to be found to some extent in nearly every one of our wood-using industries. All types of small dimension stock can not be made to advantage from thinnings but it has some definite outlet already and promises to be an increasingly important field. Another newly developing use for wood is that of plywood. Considerable progress will probably be seen in this field and it is very likely that low grade material and small pieces may be used in large amounts for the cores of this product. The pulp industry, too, may use much hardwood in the future.

In this brief time I have tried to focus your attention on some of the outstanding facts that show the importance of hardwoods nationally, and particularly in New York State. It is not easy or always wise to draw conclusions or make

predictions based on statistics where so many factors and changing conditions are involved as with this long time crop of timber. It is evident, however, that foresters should give much more attention to the use of this timber that is being grown and managed. Fast growing hardwood species of high quality wood that can be used in maintaining and stabilizing the wood industry is a consideration worthy of the foresters' immediate attention.

The poison-oak grows naturally in Virginia, Pennsylvania, Carolina, and Japan, rising with a strong woody stalk to the height of twenty feet and upwards. An incision being made into the tree, a whitish yellow juice, which has a nauseous smell, comes out between the bark and the wood; this tree, though it is noxious to some people, yet does not in the least affect others, and therefore, one person can handle the tree as he pleases, cut it, peel off its bark, rub it or the wood upon his hands, smell it, spread the juice upon his skin, and make more experiments, with no inconvenience to himself; another person, on the contrary, dare not meddle with the tree while its wood is fresh, nor can he venture to touch a hand which has handled it, nor even to expose himself to the smoke of a fire which is made with its wood, without soon feeling its bad effects; for the face, the hands, and frequently the whole body swells excessively, and is affected with very acute pain; sometimes blisters arise in great plenty, and make the sick person look as if he was infected with the leprosy. In some people, the external skin peels off in a few days, as is the case when a person has scalded or burnt any part of his body. Nay, the nature of some persons will not even allow them to approach the place where the tree grows, or to expose themselves to the wind which carries the effluvia or exhalation of this tree with it, without letting them feel the inconvenience of the swelling just described.—*The Forester's Guide* by Robert Monteath, 1836.

SOME PRELIMINARY GAME MANAGEMENT MEASURES FOR NEW ENGLAND CONDITIONS

COMMITTEE REPORT[1]

New England Section, Society of American Foresters

This report by a sub-committee of the New England Section of the Society, while not exhaustive, is suggestive and is evidence of the increasing interest that is being taken in wild life as an important land resource and land use. The report shows there is a large field for inquiry and study in providing suitable food and coverts by species of game, and that the game manager must have or must acquire a broad knowledge of the habits and requirements of individual species in their practical relation to given areas.

IN THE last report of your committee, we promised to give you some of the management practices usable in our region to increase the supply of fish and game. Since the Civilian Conservation Corps is to be continued another year, it seems timely to outline some of these things, since many can be accomplished as a result of the silvicultural work of this Corps.

In order to show any worthwhile results, improvement work should be of such a nature that its effects will be felt over several years or else the improvements should be capable of maintenance by some permanent organization. Food patches planted and maintained only a year or two would have little value but if permanently maintained could in many cases hold pheasants in otherwise impossible pheasant country. Any work undertaken should be aimed at the improvement of one of the really critical factors affecting the game species in question. As an example, planting for cover in much of northern New England is like carrying the proverbial coals to Newcastle, but, in many sections, winter food is a definitely limiting factor for one or more species of game. Another requirement which should be met in planning the work is that, where the object is the provision of food or cover alone, only native or naturalized plant species should be used. Our knowledge of food habits is, at best, meager, but we can be sure that a few of our native species will succeed under a given set of conditions and that they will be used for food by the game for which they are planted. This is especially true of such a game species as the ruffed grouse whose feeding habits seem to be capable of little change. To be of most value, work should be planned and the areas treated should be kept under observation by someone trained in game work. Results of this work, which is necessarily of a pioneering nature, will be most valuable as a guide in developing a sound game management policy for the region.

Although the details of New England game management are still extremely sketchy, a few studies, such as the one being made of the ruffed grouse by Gardiner Bump and his associates in New York (1, 2, 3, 4, and 5), are beginning to give us some of the requirements which must be met in order that a species may do well. There are also some practices which favor most species in the region. Under this last head come the release from suppression of wild apple trees and the planting of young apples at advantageous points. Another practice of proven value

[1]Report of Sub-committee on Fish and Game Management, New England Section, Society of American Foresters. Presented at Springfield, Mass., February 20, 1934.

offered by Aldo Leopold is the planting of white clover along roads and in openings. Still another is that of leaving food plants when roadsides are being cleared.

Our No. 1 New England game bird is unquestionably the ruffed grouse. Many of our older hunters have watched the same sections over a period long enough to see the grouse come in as abandoned farms with their apple trees, berry patches, open areas, and groups of pines and birches came to furnish ideal conditions; to see the birds build up to a peak lasting for a decade or so and then, as the succession continued into dense forest growth, to watch the area fail as a grouse cover. The place had "grown up," but just why should a woods bird like the grouse dwindle? At the American Game Conference in New York last month, Mr. Edminster, one of the New York grouse investigators, gave a paper analyzing the needs of the bird (4). One of their preliminary surveys showed that, on two five-hundred-acre areas comparable except for type of cover, one having a solid coniferous plantation 14 years old and the other a natural combination of types ranging from open land through the various stages to old woods, ninety-five per cent of all grouse were on the natural area. From this can be seen the effect of the usual planting program on the most suitable grouse cover. They find in the New York study that special coverts are used at different times during the year. In the spring hardwoods are necessary for nesting; in summer slash areas provide berries for food; in fall overgrown brush land supplies fruits of various kinds; and in winter conifers furnish the necessary cover. Open areas are also required the year round.

Several specific practices can be recommended for grouse improvement work. One of the most useful and easiest to supervise is the release of food plants from suppression. By far the most important of these is the apple. An analysis of the food in ninety-three grouse stomachs taken during winter in the northeastern states and examined by Leon Kelso of the Biological Survey (6) showed that of the seventy-five kinds of vegetable food taken, apple twigs, buds, leaves, and fruit formed the greatest bulk or ten per cent. There was also a marked increase in content of apple with the passage of the winter months ranging from 2.3 per cent for December to 27.2 per cent in March. In other words, during the period of greatest climatic stress for the grouse, apple was its most important food. Other species which should also be released are the wild grape, highbush cranberry (*Virburnum Opulus*), common barberry (*Berberis vulgaris*), bittersweet (*Celatrus scandens*), the sumachs (*Rhus*), buckthorn (*Rhamnus cathartica*), black alder (*Ilex verticillata*), and Crataegus. Cutting a tree in which a grape vine is climbing will give the vine more light and make a fine grouse cover. Oak and beech mast are fine fall partridge foods and the production and retention of large crowned trees that produce good seed crops is a great aid to the grouse. Enough birch, aspen, or *Ostrya* should be kept in any grouse area to provide winter budding for the birds. The planting of white clover provides needed summer food, both insect and vegetable.

On areas where definite, planned development can be carried out for the grouse, silvicultural practices can often be made to benefit the birds as well as the forest. Large stands of either conifers or hardwoods should be broken up by cuttings. A reasonable number of blanks and wide margins along roads and hedgerows in plantations may easily be worth more as necessary openings for game than they would be if fully stocked with trees. In areas lacking winter cover, patches of conifers should be planted. Food plants should be introduced where they are lacking, and some openings should be maintained. It is this combination of favor-

able types close together which determines the number of coveys which can be maintained on a given tract. The grouse is a bird of the forest borders. The New York investigation has shown that under their conditions the bird seldom goes more than three hundred feet away from an opening. Its cruising radius is also limited. In addition to providing more places capable of producing coveys, this type of improvement work will scatter the existing stock of birds which, it is thought, may lessen the effect of the cycle which periodically wipes out all but a seed stock of the birds (4).

The ring necked pheasant has been so generally introduced in New England and, in some cases, with such success that it is now a very definite factor in our game production. Our severe winters seem to hold little terror for good Mongolian stock, but the bird is largely a seed eater and over much of central and northern New England there isn't sufficient winter food to hold the birds and they simply leave for country where cultivated land with its weed seeds and occasional corn shock or buckwheat field offers them a living.

A few of our woody native plants provide winter food for the pheasant. It is just another member of the long list using apples for food. It is also fond of the fruit of the highbush cranberry, the nightshade (*Solanum Dulcamara*), and common barberry so these should be favored wherever possible. However, fruits of these plants alone are seldom plentiful enough to hold pheasants, and food patches of grains left standing are necessary to provide the bulk of the bird's diet. A quarter acre of fertile ground adjacent to good winter cover such as a swampy area with dense grass or brush will provide food over winter for a good sized flock. In his well known work at Williamston, Michigan, Wight (8) has found that food patches with several different grains mixed and thinly sown produce the best results. Some of the species used are buckwheat, Kaffir corn, corn, sorghum, millet, hemp, flax, Sudan grass, soybeans and cowpeas. The corn should be hoed once and is, of course, of little use where the corn borer control laws make necessary the removal of the stalks in fall. A native bush clover, *Lespedeza capitata*, which is found on old fields and burns in central New England, seems to have good possibilities as a pheasant food. There is apparently none of the seed on the market, and it will have to be grown in quantities if it proves itself a valuable winter food.

The woodcock is one of our most important game species, but so little is known of his food and cover requirements that we are still mostly in the dark. Dr. Pettingill (9 and 10) has been working on the habits of the bird for several years, and we can look forward to the publication of his results.

The recovery in numbers made by the deer in New England is ample proof of its ability to thrive under existing food and cover conditions. The animal has a fairly large individual range and is able to find suitable conditions at any season among the types of vegetation created by farm abandonment and cutting of timber.

Contrary to general belief, grass forms only a small part of the deer's food even in summer. Clover and weeds of various kinds are relished, and white clover planting is valuable. Apples are a staple part of the fall and winter diet, and at Petersham this is kept up until February, at least, and while a foot or more of snow covers the fruit. Sumach should also be favored, as its fruit heads are much sought. The main winter diet is hardwood browse, and any cutting or weeding produces good food conditions. The planting of conifer groups where needed on south and east slopes is a very valuable winter protection measure.

The gray squirrel is an animal of the

big hardwoods depending on them for both food and shelter. The nut trees furnish its main winter food and the production of large crowned individuals of these species by thinning or releasing will greatly favor the squirrels in the future.

While many hunters do not consider the cottontail rabbit fair game, the fact that an estimated 400,000 are killed yearly in New England shows its real importance.

The cottontail is an animal of the fields and thickets. Summer food and cover are usually available wherever the animal is found. However, large areas are unsuited as winter cover. Trippensee at the University of Michigan (14) has found that during winter either thick brush or conifers with limbs close to the ground are necessary for cover and small hardwoods are needed for food. An older hardwood stand without small advance growth or openings overgrown with berry briars and brush is totally unsuited to the animal's use. In this direction thinnings or partial cuttings favor food conditions. Coniferous plantings make the best of winter cover, but solid plantings are usable for only around three to five years between the time when the lower branches close and that at which a dead length of a foot or two has developed. To be of most value as cover, plantings should be made as single trees or small groups in waste places. Hardwood and coniferous swamps both afford good food and cover. The great value of apples and apple browse as winter food is well known to everyone familiar with the animal.

The enemies of the rabbit include the roll call of the flesh eaters both mammal and bird. The reason why the rabbit is able to exist at all in part of our region is that, when pursued, it loses no time in reaching some tangle or stone wall where the larger enemies cannot follow. In this connection much can be done for the rabbit by piling brush from cuttings in piles at least four or five feet across. These will furnish the best of cover for two or three years. Newly cut hardwood brush is also used for food during fall and winter.

So little is known about the snowshoe hare that recommendations for its management are almost totally lacking. Every year probably at least a thousand dollars are spent in stocking southern New England covers with this animal, but the fact that many of these plantings are never heard from shows the need for a knowledge of its requirements. The snowshoe will feed on the tops of recently cut hardwoods, being especially fond of birch and poplar, and the cutting of a few wolf trees for winter food has proven an effective means of supplying food where suitable browse is lacking.

On many of our inland bodies of water where summer water levels are fairly constant, our native ducks can be attracted and held during the breeding season if suitable duck foods are established. McAtee of the Biological Survey has made a longtime study of this problem (11). Much of the water in New England is acid, and the plants from alkaline waters can often be counted on as failures under our conditions. Transplanting food plants or gathering and sowing the seed is a very simple operation and one which will pay big dividends, especially in such waters as the newly formed lakes being constructed by the C.C.C. Not only the ducks but the muskrat and fish will benefit. Some of the many species of plants adapted to our region and used as food by the ducks are the various native pondweeds (*Potamogeton*), bur reeds (*Sparganium*), arrowheads (*Saggitaria*), water cress, and wild rice. Wild rice can now be gotten from areas in Vermont, the Connecticut Valley in Connecticut, and, we believe, from several lakes in Maine.

In conclusion let us remind you that these are only a few pieces in the puzzle of the management of these species. Their complete cycle of requirements, the radius

covered by an individual or covey at various seasons, the possible production of a given area under management with one species or a mixture of species, the real importance of the so-called predatory species, the importance and control of disease, the mechanics of our grouse and hare cycles, and dozens of other absolutely essential similar problems are still unsolved. However, we cannot wait for all the information before making a beginning, and really doing something with the game will help to fill the gaps in our necessary knowledge. Game and the right to hunt it are things with which there is no danger of overproduction, and the day is not far distant when it will be treated as a crop instead of as an accident. Public opinion and the constantly increasing demand for hunting are going to bring this about, and we, as foresters, should realize the importance of our fish and game as a crop and consider it as a source of income.

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GROWTH, SPECIFIC GRAVITY, AND SHRINKAGE OF TWELVE DELTA HARDWOODS

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ALTHOUGH a large quantity of southern delta hardwood timber has been cut and satisfactorily utilized, there is a dearth of accurate information concerning the character and properties of these woods. Accordingly the study reported here was undertaken by the Forest Products Laboratory to determine some of the essential qualities of delta hardwood timber and to show in what way, if at all, local environmental conditions affect those qualities. This study is only a part of a fairly broad program on southern hardwoods now under way at the Forest Products Laboratory.

The characteristics of the wood receiving the greatest attention in the present study are specific gravity and shrinkage. The specific gravity of wood usually serves as a good index of its hardness, strength, and other mechanical properties. The shrinkage characteristics of delta hardwoods were studied because of the general impression among lumber users that delta material, particularly oak, is likely to shrink excessively.

Forest Areas Investigated

The study was confined to forest areas which provide local differences in conditions, especially with respect to flooding and depth and duration of flood waters. The stands investigated were located in Concordia and East and West Carroll Parishes, Louisiana, and Yazoo County, Mississippi (Table 1).

The forests in Concordia Parish represent forest type and tree forms characteristic of regions subject to submersion to a depth of 12 to 15 feet (more in flood years) for a period of several months. On account of the prolonged flooding much of the usual herbaceous and shrubby vegetation typical of unflooded areas is lacking. In general the forest is rather open, reproduction is sparse, trees of small size are infrequent, and trees which constitute the forest appear healthy on the exterior but many of them are defective within. Often they have been attacked by borers or have other defects, such as ring shake, which give them a low commercial value. The open condition of the stand has resulted in the development of trees with wide spreading crowns and comparatively short boles. In the usual logging one tree rarely yields more than two logs of good quality.

The soils of the region are formed from the sediment which has settled out of the standing water. Except in close proximity to streams the soil particles are very finely divided, forming compact clay soils. The prevailing soil type in Concordia Parish is Sharkey clay, a soil which is very impervious and poorly drained. In dry summer seasons it often bakes hard and cracks of considerable

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TABLE 1

LOCALITY DESCRIPTION, SPECIES OBTAINED, AND NUMBERS ASSIGNED TO TREES FROM WHICH SAMPLES WERE TAKEN

Location	Topography	Elevation above sea level	Flooding	Soil type	Species	Tree numbers
1. Concordia Parish, La.	Level	45	15+feet backwater annually.	Sharkey clay	Overcup oak (Quercus lyrata)	1-6
a. Cross Cocodrie Bayou	"	45	"	"	Nuttall oak (Quercus nuttallii)	7-11
	"	45	"	"	Cedar elm (Ulmus crassifolia)	12-16
	"	45	"	"	Water hickory (Hicoria aquatica)	17-21
	"	45	"	"	Green ash (Fraxinus pennsylvanica lanceolata)	22-24
	"	45	"	"	Persimmon (Diospyros virginiana)	25-26
b. Black River	"	45	10—20 feet backwater annually.	"	Tupelo gum (Nyssa aquatica)	28-32
	Low ridges	40-50	15—20 feet backwater annually.	Sharkey clay (better drained phase)	Overcup oak	33, 34, 36-38
2. Yazoo County, Miss.						
a. Bluff	Steep	300+	None.	Memphis silt loam	Swamp red oak (Quercus rubra pagodaefolia)	44-48
	"	300+	None.	"	Water oak (Quercus nigra)	41-43, 49, 50
b. Yazoo Delta	Level	95	6 feet backwater annually.	Sharkey clay	Willow oak (Quercus phellos)	51-55
	"	95	"	"	Overcup oak	56-60
	"	95	"	"	Nuttall oak	61-65
3. East and West Carroll Parishes, La.						
a. Graveyard Bayou	"	80-85	Occasional—protected by levee.	"	Water oak	67-71
	"	80-85	"	"	Nuttall oak	73-77
	"	80-85	"	"	Green ash	78-80
	"	80-85	"	"	Overcup oak	81-85
	"	80-85	"	"	Honey locust (Gleditsia triacanthos)	39
b. Oak Grove	Low ridges	100	None.	Carroll silt loam.	White oak (Quercus alba)	86-90
	"	100	None.	"	Swamp red oak	92-95
	"	100	None.	"	Willow oak	96-100
c. Joe's Bayou	Low terrace	90	Occasional—protected by levee.	Wabash clay	Swamp red oak	101-105
	"	90	"	"	Willow oak	106-108

size are formed at the surface.

The samples of wood collected for the study from Concordia Parish consisted of overcup oak, nuttall oak, cedar elm, water hickory, green ash, and persimmon. Also samples were obtained from five tupelo gum trees growing in a typical tupelo brake where the ground is covered by water at all times except during the drier seasons of the year. These trees were strongly buttressed to a height of 8 feet or more. In addition, samples were obtained from five overcup oak trees growing near the Black River where the ground was of rather uneven topography on account of a series of low ridges parallel to the general course of the river. The difference in elevation of the ridges and the depressions between them was 8 to 10 feet. In this location the overcup oak occurred more frequently at the lower elevations or on the sides of the ridges.

In Yazoo County, Mississippi, samples were taken from five swamp red oak trees and five water oak trees growing in

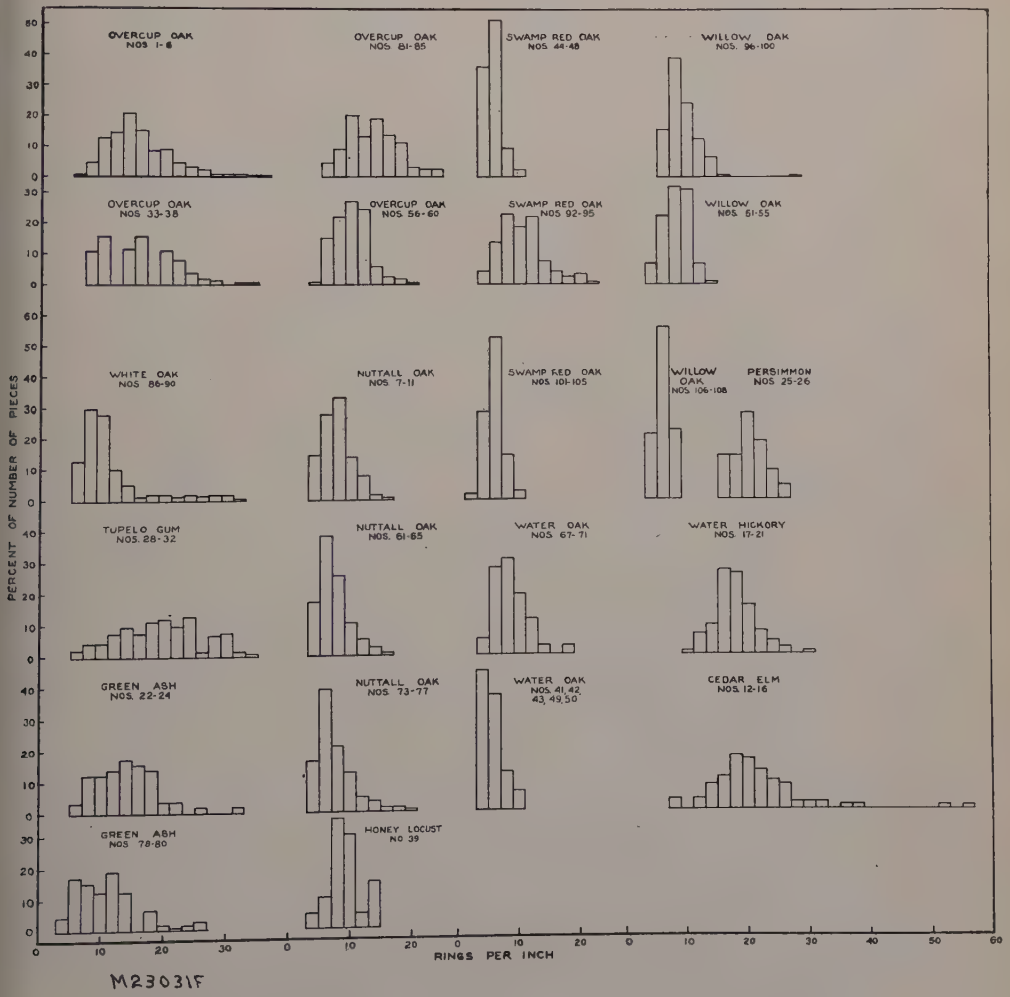

Fig. 1.—Variation in rate of growth of delta hardwoods

a second-growth stand on a 300-foot bluff near Germania, Miss. These trees were 60 to 70 years of age. They were tall and well formed and of fairly rapid growth. Samples from willow oak, overcup oak, and nuttall oak were also obtained near Germania from a level area that is subject to annual backwater overflow to a depth of about 6 feet or more. The elevation here is 95 feet above sea level and the soil is a heavy sharkey clay.

In East Carroll Parish samples of water oak, nuttall oak, green ash, overcup oak, and honey locust were obtained from Graveyard Bayou near Alsatia, Louisiana. This area is very flat and is from 80 to 85 feet above sea level. It was said that cotton had been grown on the area before the Civil War. The soil type where the trees were cut is sharkey clay. The water oak, nuttall oak, and green ash trees in this location were fairly young, ranging from 75 to 80

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VARIATION IN RATE OF GROWTH, SPECIFIC GRAVI

Tree numbers	Species	Trees sampled	Age (range)	Diameter breast high (range)	Determinations	Rate of growth (Rings per radial inc		
						Total range	Range of middle three-fourths of specimens	Range of middle one-half of
		No.	Years	Inches	No.			
33, 34, 36-38	Overcup oak (Quercus lyrata)	5	100-175	24-27	164	7-33	9-22	10-19
1-6	"	6	75-200	16-31	212	6-35	10-21	12-18
81-85	"	5	100-180	21-27	152	5-24	8-18	10-16
56-60	"	5	70-115	18-23	159	4-19	6-12	7-12
86-90	White oak (Quercus alba)	5	100-165	21-24	157	5-31	6-17	8-11
101-105	Swamp red oak (Quercus rubra pagodaefolia)	5	30-50	17-18	112	2-10	4-7	____
92-95	"	4	75-130	19-24	118	3-22	6-14	7-12
44-48	"	5	55-60	21-28	157	3-10	4-6	____
73-77	Nuttall oak (Quercus nuttallii)	5	70-75	21-28	153	3-19	4-10	5-8
7-11	"	5	60-110	20-28	166	3-16	4-10	5-8
61-65	"	5	60-65	17-25	117	3-16	4-10	5-8
106-108	Willow oak (Quercus phellos)	3	40-50	17-18	66	3-8	4-7	____
96-100	"	5	75-110	22-24	135	5-27	6-12	7-10
51-55	"	5	45-65	21-22	116	3-14	5-10	6-9
41-43, 49, 50	Water oak (Quercus nigra)	5	40-60	19-24	114	3-10	4-7	____
67-71	"	5	65-75	22-28	176	4-18	5-11	6-9
25-26	Persimmon (Diospyrus virginiana)	2	92-94	12-14	21	15-26	____	18-22
12-16	Cedar elm (Ulmus crassifolia)	5	104-174	16-20	87	7-55	14-26	16-23
17-21	Water hickory (Hicoria aquatica)	5	80-134	15-21	96	9-29	14-22	15-19
78-80	Green ash (Fraxinus pennsylvanica lanceolata)	3	65-70	18-21	105	3-26	5-17	7-14
22-24	"	3	86-98	17-22	57	6-32	7-18	9-17
39	Honey locust (Gleditsia triacanthos)	1	77	21	21	4-14	____	7-10
28-32	Tupelo gum (Nyssa aquatica)	5	130-230	19-30	133	5-33	11-27	14-23

years. The trees were of good size for their age, many of them being more than 24 inches d.b.h. and over 100 feet high. In addition, five overcup oak trees were cut from an adjoining area of virgin forest.

Other oak samples obtained comprised five second-growth red oak and three willow oak trees from Joe's Bayou near Lake Providence, Louisiana. The elevation above sea level at this place is 90 feet, the bottom of the bayou being 10 or 15 feet lower. The soil type for a narrow strip bordering Joe's Bayou is Wabash clay.

In West Carroll Parish samples of five white oak, four swamp red oak, and five willow oak trees were obtained near Oak Grove at an elevation of 100 feet. The topography here is characterized by low ridges about 5 feet high, alternating with intervening level areas. The surface of the ridges was covered with dead leaves, litter, and briars, all of which

VOLUMETRIC SHRINKAGE OF DELTA HARDWOODS

Specific gravity				Volumetric shrinkage (Per cent of green volume)			
Total range	Range of middle three-fourths of specimens	Range of middle one-half of specimens	Average	Total range	Range of middle three-fourths of specimens	Range of middle one-half of specimens	Average
.463-0.647	0.495-0.590	0.518-0.571	0.544	10.7-35.6	14.8-29.5	17.0-27.0	21.9
.415- .650	.495- .598	.516- .580	.546	10.6-35.1	14.6-25.6	15.8-22.7	19.5
.507- .660	.538- .619	.558- .605	.580	13.1-27.8	15.7-22.3	16.5-19.8	18.6
.495- .664	.524- .595	.539- .582	.560	12.0-23.8	14.0-19.1	14.4-17.4	16.3
.516- .728	.586- .685	.609- .665	.636	12.5-26.2	16.0-20.7	16.6-19.3	18.0
.596- .717	.611- .669	.617- .651	.638	15.5-23.7	16.3-20.0	16.8-18.6	17.9
.534- .672	.572- .631	.580- .621	.600	14.3-24.1	15.6-19.4	16.2-18.6	17.5
.569- .659	.586- .636	.600- .627	.613	11.3-23.2	15.4-18.9	16.0-18.0	17.0
.506- .644	.546- .593	.555- .584	.569	12.4-21.7	14.4-18.4	15.2-17.6	16.3
.494- .600	.525- .572	.536- .563	.550	11.7-25.9	13.9-18.1	14.4-16.9	16.0
.534- .627	.551- .610	.563- .594	.579	12.9-21.5	14.2-17.5	14.7-17.0	16.0
.624- .699	.636- .674	.640- .666	.654	14.5-20.0	15.6-19.0	16.1-18.1	17.1
.523- .653	.545- .607	.562- .599	.582	12.6-27.8	14.5-19.1	15.1-17.3	16.7
.518- .622	.552- .598	.562- .593	.577	12.6-22.2	14.0-18.7	15.0-17.4	16.4
.535- .651	.582- .640	.597- .630	.613	13.5-21.8	15.1-18.9	15.9-18.0	17.0
.457- .667	.530- .594	.541- .577	.562	10.7-19.7	13.9-17.5	14.6-16.8	15.7
.452- .645	.476- .628	.503- .607	.562	11.7-21.8	15.2-21.4	16.5-21.1	18.6
.490- .674	.552- .645	.577- .628	.601	10.2-21.2	12.7-16.8	13.4-15.9	14.7
.459- .635	.508- .610	.528- .596	.563	9.2-22.8	10.9-15.4	11.7-14.4	13.3
.354- .609	.400- .574	.477- .559	.515	5.2-17.0	9.5-15.7	11.3-14.6	12.9
.346- .595	.366- .555	.378- .545	.467	7.5-16.6	9.2-13.7	9.7-12.8	11.4
.504- .681	.545- .648	.594- .638	.612	9.0-15.3	10.1-15.0	10.3-12.9	11.7
.193- .517	.233- .458	.260- .443	.357	4.5-18.1	7.8-13.9	9.5-13.2	11.2

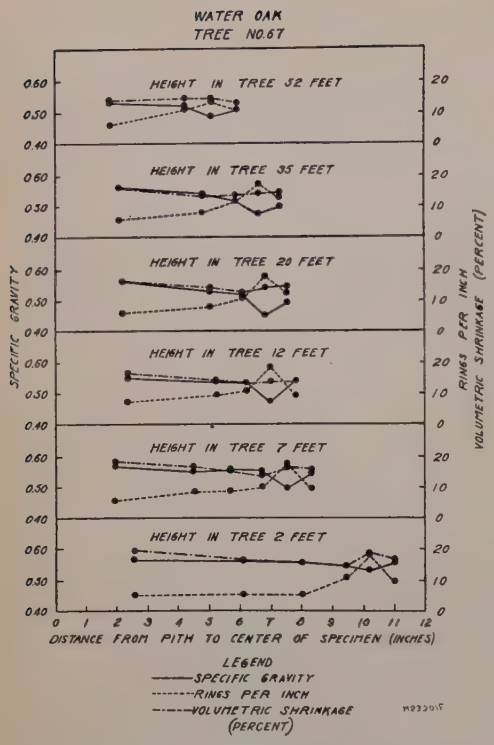

Fig. 2.—Rate of growth, specific gravity, and volumetric shrinkage according to position in tree for water oak.

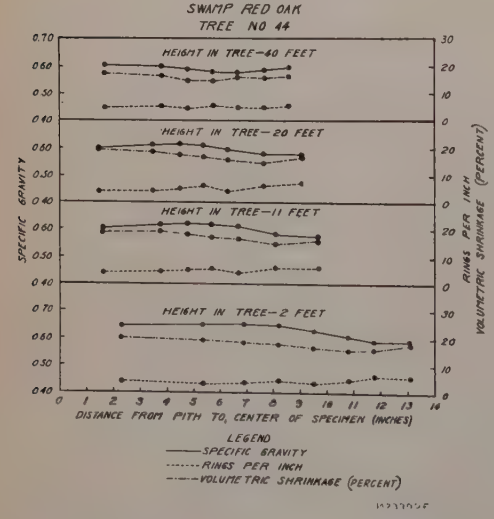

Fig. 3.—Rate of growth, specific gravity, and volumetric shrinkage according to position in tree for swamp red oak.

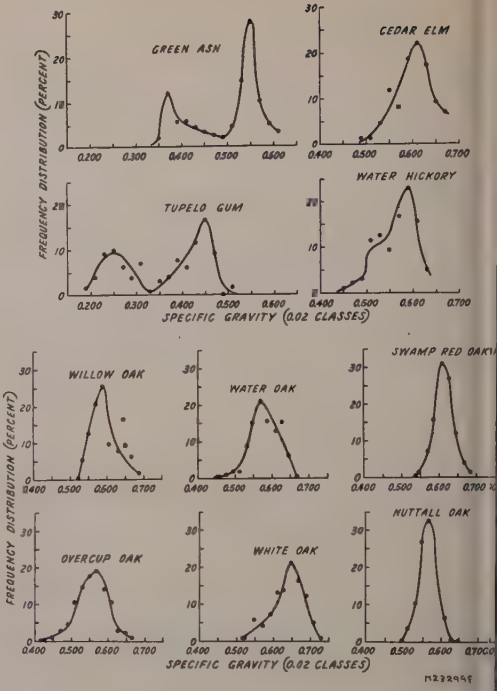

Fig. 4.—Variability in specific gravity of tre delta hardwoods.

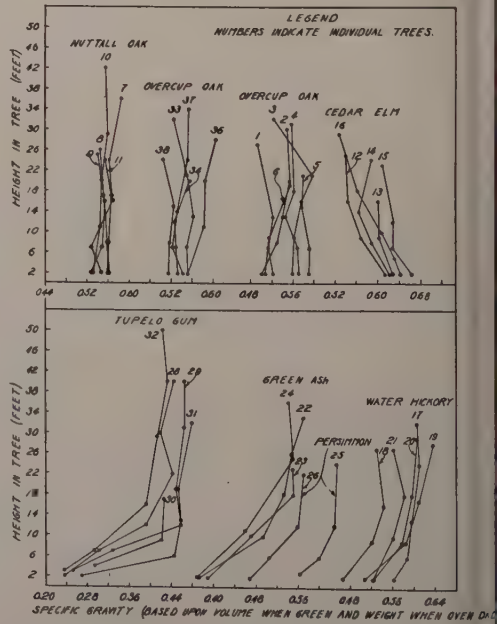

Fig. 5.—Average specific gravity at differen heights in individual trees in the backwater are

were absent on the intervening spaces which are covered by water for several weeks each year. The ridges supported white oak, swamp red oak, red oak, true hickories and other species typical of high ground, whereas the flats were occupied by willow oak, persimmon, overcup oak, water hickory, ash, and elm. The soil type for the area is Carroll silt loam.

Preparation of Specimens

With a few exceptions five trees of a species in one location constituted the basis of the samples taken. Sections of the tree boles one foot in length were taken at different heights. Usually four to six sections were taken from each tree. The first cross section was cut just above the stump, others were taken at intervals of 6 to 15 feet. In situations subjected to flooding, cross sections were cut at closer intervals in the lower portion of the tree than elsewhere.

In each case, as soon as cut, the ends of the sections were coated with a preparation of hardened gloss oil. Each piece was labeled and marked to designate its position in the tree.

A segment representing about one-fourth of the cross section was cut from each of the sample cross-sectional blocks. This segment was further cut into specimens for the determination of specific gravity. The specific gravity specimens were 4 inches in length and included the same annual rings of growth as far as practical at different heights in the trees. Volumetric shrinkage was measured on the specific gravity specimens.

At all times during cutting and until initial weights and measurements were taken, the specific gravity and shrinkage specimens were protected from drying by covering them with moist cloths. The samples were conditioned by storage in 75 per cent and 30 per cent relative humidity rooms after which they were dried to a moisture-free condition.

Data Obtained

The data obtained included the radial dimension and number of growth rings

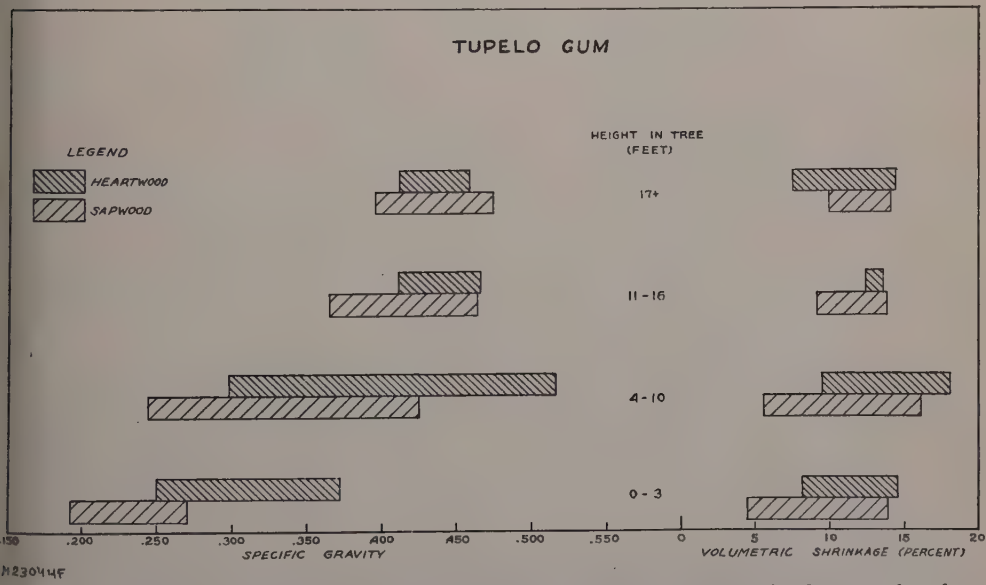

Fig. 6.—Comparison of variation in specific gravity and volumetric shrinkage for heartwood and sapwood of tupelo gum.

for each specimen. The weight and volume of the specific-gravity specimens and the measurements of the shrinkage specimens were taken while the specimens were green and again while moisture-free. The specific gravity values used in this report include only those based upon the weight when oven dry and the volume when green.

The variation in the rate of growth, specific gravity, and volumetric shrinkage of the trees studied are given in Table 2 and Figures 1 to 8.

Discussion of Results

Rate of growth.—Most of the southern hardwood species maintain a fairly rapid growth rate as indicated in Figure 1 and Table 2. A fairly close correlation between changes in rate of growth and changes in specific gravity in the same cross section or tree, especially in material from the outer portion of the trees may be seen in Figures 2 and 3. While such correlations as shown in Figures 2 and 3 are readily found in individual trees, a mixture of samples from two c

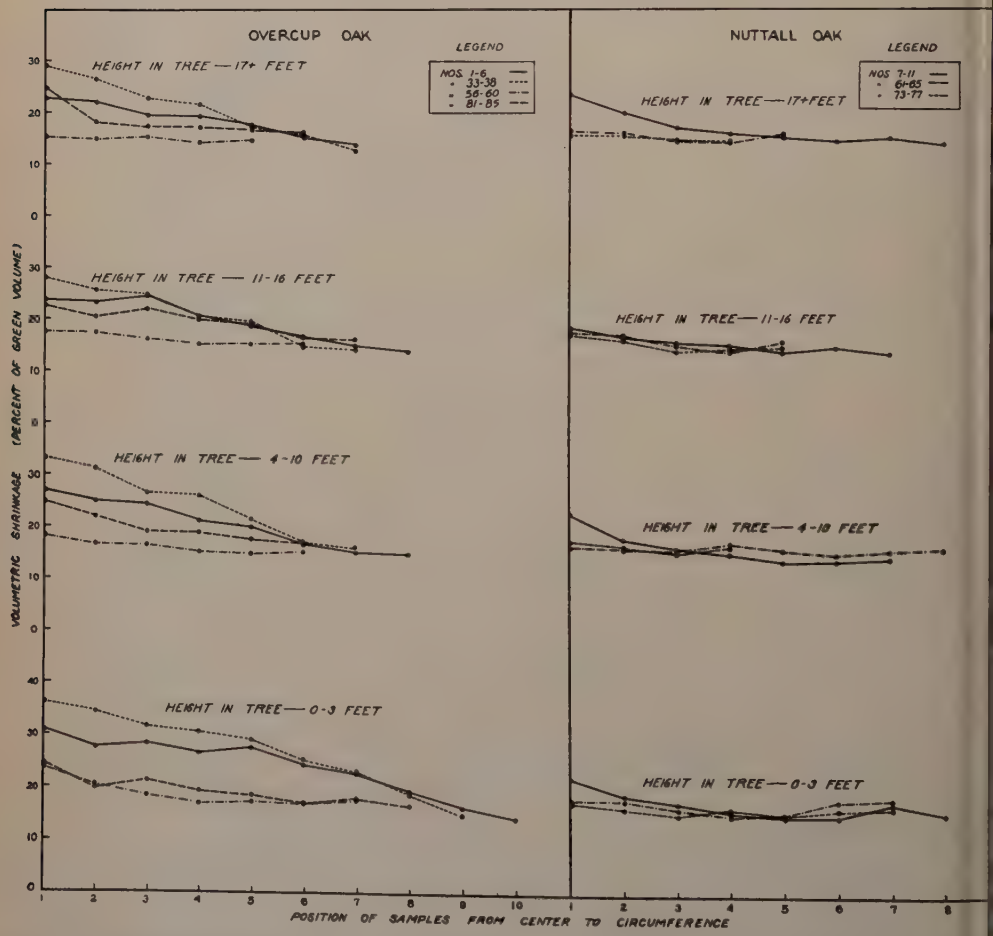

Fig. 7.—Average volumetric shrinkage according to position in the tree for overcup oak and nutt oak.

more trees confuses the relationship because the same rate of growth in different trees may not necessarily yield wood of equal weight. Rate of growth does not show any appreciable correlation with volumetric shrinkage (Fig. 2).

Specific gravity.—The greatest variation in specific gravity was found in the wood of the buttressed trees from the inundated regions (Figs. 4 and 5). The double humps shown in Figure 4 in the curves for tupelo gum and green ash may be explained by the rather abrupt change from the very light wood in the buttressed portion of the trees to the heavier wood above about the 10-foot height. Because the transition occurs in a relatively short vertical length the wood above the area of change and the wood below it appear as almost totally different species. The variability curves for water hickory shows a similar result but in a lesser degree.

The overcup oak trees from Concordia Parish contained wood of considerable variation in weight throughout the cross section. This may be accounted for partly in the difference between heartwood and sapwood, and partly by a slowing down of growth in the sapwood, but the reason for the slower growth is not fully apparent. It is not caused by crowding and competition, the reasons usually attributed to slow growth in old-growth forest trees, since the trees have abundant growing space. It can hardly be due to the age of the trees for it has been found under favorable conditions that even very old trees will continue to grow rapidly.[4] Since also in this location the water hickory, the cedar elm, and portions of the ash trees also exhibit slow growth, it seems reasonable to attribute the slow growth, at least in part, to the surface and subsurface water conditions.

The wood of the nuttall oak from the three locations investigated shows little difference in quality or behavior. The

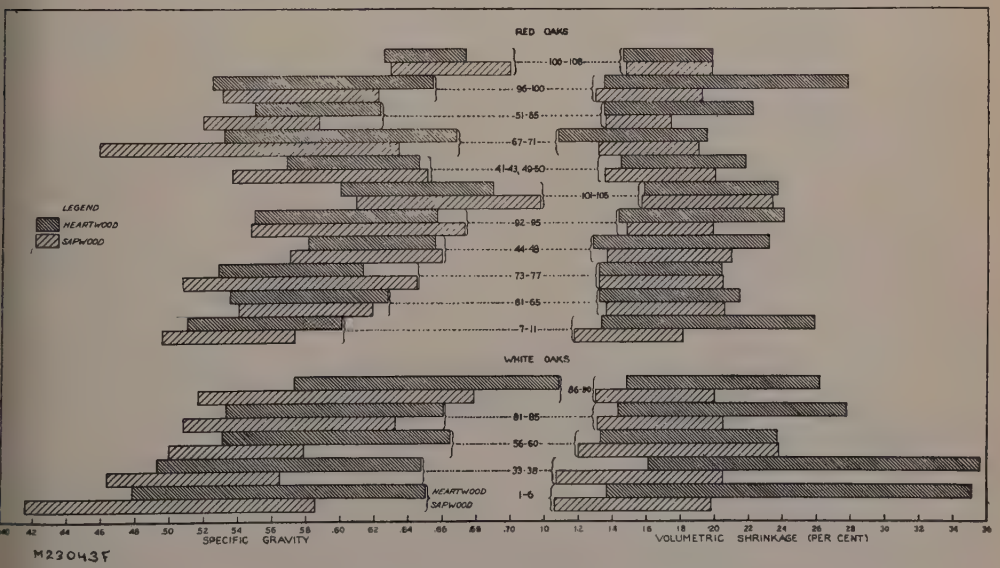

Fig. 8.—Comparison of variation in specific gravity and volumetric shrinkage for heartwood and sapwood of red and white oaks.

[4]Paul, Benson H. The Application of Silviculture in Controlling the Specific Gravity of Wood. U. S. Dept. of Agric. Tech. Bul. 168, pp. 1-20, illus. 1930.

wood from the more deeply flooded places averages a little lighter than that from East Carroll Parish where levee protection keeps off flood waters the greater part of the time. Although nuttall oak is not exceedingly abundant in the backwater country, undoubtedly the lumber produced by it is of better grade and greater value than that from other species usually found growing with it. Nuttall oak grows rapidly, produces wood of a high degree of uniformity both in weight and shrinkage, and is fairly free of serious defects. In all places where nuttall oak was obtained it appeared to be the species most at home in the low wet bottomland areas.

Variations found in the wood of swamp red oak, willow oak, and water oak from different places cannot be attributed to the soil and moisture conditions as much as to the character of the forest and of the trees investigated. The actual differences in the character of the wood of swamp red oak from three different situations were slight. The wood of lowest specific gravity was obtained from the low ridges in West Carroll Parish, the wood of intermediate weight came from the bluff in Yazoo County, and the heaviest wood from the terrace along Joe's Bayou in East Carroll Parish. In the latter place the trees were younger and because of little competition had grown quite rapidly. In contrast to the swamp red oak the heaviest wood of water oak was obtained from young trees on the Yazoo Bluffs and lighter wood from the Mississippi delta in East Carroll Parish. In this case the trees on the bluff grew more rapidly because of less competition.

The wood of willow oak from the Yazoo delta and from West Carroll Parish showed only slight differences, but that obtained from three young thrifty trees at Joe's Bayou was decidedly heavier.

The green ash trees growing in th deeply flooded areas of Concordia Parish were strongly buttressed, the buttressing extending well up the trees. In the ash trees of East Carroll Parish the buttressing did not extend so far upward and the wood averaged somewhat heavier a corresponding heights in the trees. I both locations the wood in the lowe part of the trees was very light and be cause of rapid taper the proportion c heavier wood above the buttresses wa small.

Tupelo gum, water hickory, and ceda elm were studied from only one loca tion in the delta. Tupelo gum growin in water produced wood having a wid range in properties. The habitat of tu pelo is in low swamps or sloughs wher the ground is covered with water excep in late summer or in unusually dry sea sons. The lower portions of the tree taper abruptly upward from 4 feet c more in diameter at the ground line t less than 2 feet in diameter at a poin 8 or 10 feet higher. Like much of th delta ash, the wood from the upper an lower portions of the tupelo trees is o such different character that the two type of wood usually are not suited for th same purpose (Fig. 6).

A species concerning which little known commercially is the cedar elm When cut into lumber it is not separate from other elm, although it is sometime referred to as hard elm or rock elm Cedar elm is the only species from th deeply flooded backwater country whic produced decidedly heavier wood at th butt than higher in the tree (Fig. 5 The rate of growth of trees of this speci is exceedingly slow, but the wood straight grained, has an attractive re dish brown color and doubtless it suitable for a variety of uses. In com parison with the oaks the trees are ratho

small, being about 18-20 inches d.b.h. Probably the most objectionable feature of cedar elm is its habit of producing many small somewhat pendulous branches low down on the stem, limiting the timber production to about one clear log from each tree.

Persimmon trees in the flooded areas contain wood which is lighter at the base than higher in the trees (Fig. 5). It is unlikely that much delta persimmon has the hardness usually found in this species elsewhere. The trees are fairly tall, straight, and of especially large size for this species.

Honey locust at Graveyard Bayou proved to be very defective. When obtaining samples several trees were discarded because of extensive heart rot and only one sound tree was taken. Ring shake is a common defect in this species.

Comparisons of the same species with respect to origin, whether in the delta or on the bluff, indicate that the soil type and drainage are less important in influencing the weight of the wood than the character of the stand and the thriftiness of growth of the trees. In swamp red oak the heaviest wood of the species was found in the delta proper; in water oak the heaviest wood was found on the Mississippi Bluff. In both cases the heavier wood was produced in young thrifty stands. In other instances both heavy and light wood occurred in the same cross section of the same tree, the difference reflecting progressive changes in forest conditions rather than changes in soil and soil moisture conditions.

Volumetric shrinkage. — Volumetric shrinkage of tupelo gum varied somewhat with respect to position in the tree. The least shrinkage occurred in the thick sapwood of the buttressed portion of the trees (Fig. 6). In the green ash volumetric shrinkage varied with respect to position in tree in about the same way as in the tupelo gum.

Among the oaks, the greatest change in volume accompanying drying took place in the inner heartwood of the overcup oak from deeply flooded situations (Fig. 7). There was a general increase in shrinkage from the outer to the inner portion of these trees regardless of changes in rate of growth or specific gravity. This suggests that the condition causing the greatest shrinkage becomes intensified with increasing length of time after change to heartwood, since it becomes more evident in the older trees.

In the overcup oak trees under discussion, volumetric shrinkage ranged up to 35 per cent of the original green volume (Table 2). Even by eliminating 12½ per cent of the specimens at the upper end of the range, shrinkage up to 29 per cent was found. This excessive shrinkage still exceeded the total range of volumetric shrinkage for all of the samples of white oak and all of the samples from the different species of red oak investigated (Fig. 8). Excluding the upper 12½ per cent the greatest volumetric shrinkage of the other oaks did not exceed 21 per cent. For all species of oak studied the lower end of the shrinkage variability ranges began between 10 and 14 per cent.

In the overcup oak from the Yazoo delta the shrinkage of all the samples ranged from 12 to 23 per cent. This figure compares favorably with the range of volumetric shrinkage of the different species of red oak.

That shrinkage begins in the heartwood of overcup oak at a high moisture content was reliably demonstrated in a check run of volumetric shrinkage on matched annual rings cut from the same log sections after several months of outside storage. The moisture content of the check specimens ranged from 30 to 80 per cent, mostly from 50 to 70 per cent. Samples

which had lost only 35 to 45 per cent of their original moisture content showed an average of from 2 to 5 per cent less subsequent shrinkage than the original samples from other portions of the same annual rings in the same cross section. According to Tiemann[5] great changes in volume may be partly due to shrinkage and partly to an actual distortion or collapse of the cell structure, which occurs while the moisture content of the wood is still very high. Under these circumstances it is difficult to say how much of the change in volume is due to shrinkage and how much is due to collapse. Further work now in progress at the Forest Products Laboratory may throw additional light upon this subject.

Species for Forest Management in Delta Forests

From the standpoint of forest management[6] nuttall oak appears to be the most valuable species for timber production in the flatwoods of the backwater country or other low wet situations. Overcup oak is so defective in the backwater areas that it should be replaced by better species. The lower wetter areas were not inhabited by the other species of oak. To the credit of overcup oak it may be said that the quality of the timber is reported to be considerably better outside the limits of the backwater country. Next to nuttall oak, probably the species best suited to low wet areas is the willow oak. It was found in mixture with overcup and nuttall oaks in the Yazoo delta and was the only oak in the shallow sags between the low ridges in West Carroll Parish. Swamp red oak, water oak, and some other species not included in this study do well on the low ridges of the bottomlands, but white oak (*Q. alba*) was not found growing anywhere on lands frequently inundated.

Considered with respect to wood quality, shrinkage, and rate of growth, any of the red oak species investigated could be recommended as a timber tree in their respective habitats (Fig. 8).

The cedar elm, though a rather slow-growing species, seems less affected by flooding than most of the lowland species. It is likely that its habit of low branching could be corrected to a considerable degree by keeping the forest well stocked with trees.

Tupelo gum is probably the best species other than cypress, which can be recommended for the almost permanently wet situations where it is found. On account of the variety of purposes for which the wood of tupelo gum may be used, it should be encouraged in its natural habitats.

Green ash grows well throughout the delta, but use of wood of this species from the flooded districts undoubtedly should be confined to purposes where tough material is not required.

In the deeply flooded backwater areas the slow growth of the trees suggests a condition approaching that of continually wet swamps. It seems probable that with higher levee construction and deeper flooding that the number of species which can be successfully grown will be greatly restricted or even limited to such swamp land species as cypress, tupelo gum, black gum, willow, and cottonwood.

Summary

In portions of the Mississippi delta not deeply flooded by backwater and on adjacent bluffs the different species of oaks studied maintained a fairly rapid growth rate and produced wood which with a few

[5]Tiemann, H. D. Shrinkage of Wood, Part 2, The Cause of Collapse. Barrell and Box, V. 3, No. 6, pp. 13-14, Aug., 1929.

[6]Putnam, J. A. and Henry Bull. The Trees of the Bottomlands of the Mississippi River Delta Region. Mimeograph report from Southern Forest Experiment Station, New Orleans, La.

exceptions did not vary over a wide range in specific gravity.

In the backwater areas which are deeply flooded almost every year the overcup oak was of slower average growth; it varied more and averaged lower in specific gravity than it did in the less flooded areas. Although the nuttall oak in the backwater areas maintained its growth rate very well, the wood was not so heavy as that found elsewhere in the same species.

The heaviest wood of the oaks was found in young second-growth trees of rapid growth on a bluff and on delta areas not flooded each year.

In the periodically flooded areas the wood at the base of the tree was very much lighter in ash, tupelo gum, hickory, and persimmon than it was higher in the tree. The oaks showed little difference in specific gravity at different heights, but in ceder elm the wood was definitely heavier at the base, as is the usual case in upland trees.

At any given height in a tree, differences in specific gravity could be traced to changes in rate of growth. For example, in the oaks the greatest variation in specific gravity of wood of a species was found in the overcup oak trees of the backwater areas which had been greatly retarded in growth.

Variations in volumetric shrinkage were greatest in the older overcup oak trees. In general shrinkage was lower in sapwood than in heartwood. In both the red oaks and the white oaks the greatest differences between volumetric shrinkage of heartwood and sapwood were exhibited by the older trees, even when at the same specific gravity as in younger trees, indicating that with increasing age the heartwood changes in shrinkage characteristics. In tupelo gum and green ash the volumetric shrinkage of the wood was the least on the lighter buttressed portion.

Consideration of areas for permanent forests in the parts of the delta where flooding frequently occurs should take into account the probable unfavorable influence of flooding with respect to rate of growth as well as defects, together with the likelihood that the effects of such unfavorable influences will increase as levees are raised and backwater areas extended.

BRIEFER ARTICLES AND NOTES

"Voluntary" Political Contributions in Indiana

Hershel A. Woods, a nontechnical man appointed Assistant State Forester under Mr. Ralph Wilcox, during the latter part of 1933 personally visited many and probably all of the camps of the Civilian Conservation Corps in Indiana. In these camps he personally talked with and commissioned some individual to collect two per cent of the salaries of the supervisory force, including superintendents, technical forestry foremen and nontechnical foremen. This two per cent was supposed to be a voluntary contribution. It was made to the Hoosier Democratic Club, Indianapolis, Indiana, Bowman Elder, Treasurer. Mr. Woods was earlier in the year Chairman of this Club. The contributors were asked to fill out an application which read as follows:

Mr. Woods in his conversation, and his unofficial deputies in their solicitations for this fund created the impression that if such contributions were not forthcoming, the men might lose their jobs. Many direct statements were made to this effect by Wood's agents.

As the result of this political pressure and in violation of their professional standard or scruples, and as a prudent measure in order to safeguard their jobs many technical foresters, engineers and other foremen signed the application papers declaring themselves to be democrats and paid the 2 per cent of their salaries to the Hoosier Democratic Club. Checks for dues were mailed to the Indiana Democratic Campaign Fund and it was stated that the contributions were intended for use in the coming election. During June a heavy reduction of the E. C. W. force was made in the state, apparently with

APPLICATION FOR REGULAR MEMBERSHIP

(Only Democrats are eligible to become regular members)

I hereby voluntarily apply for an active membership in the Hoosier Democratic Club, and agree to comply with the rules, regulations and by-laws of such Club, as may now be in force or as hereafter from time to time may be adopted.

My residence is No. ..... Street, ... Township .....
City or Town ..... County, Indiana.
My voting precinct is No. ....., City ..... I am _____ years of age, and my occupation is ..... My employer is .....
I am a member of the Democratic party.

(Mark X before membership desired)

_____ Class A, Dues $1.00 per month _____ D, Dues $5.00 per month.
_____ Class B, Dues 2.00 per month _____ E, Dues 8.00 per month.
_____ Class C, Dues 3.00 per month _____ F, Dues 12.00 per month.

Name .....
Recommended by .....

No copy of the rules, regulations and by-laws of such club were ever furnished even on request.

out regard to these "contributions" since other considerations rather than membership in the Hoosier Democratic Club ap

peared to determine the choice of those taken and left. Several technical foresters who had subscribed were dismissed.

During February Ovid Butler, Secretary of the American Forestry Association, called this situation to the attention of Robert Fechner, Director of the E. C. W., who promised an investigation. This was conducted apparently not by his office but by the Post Office Department, in March. It is definitely known that affidavits testifying to the above facts were made to inspectors of this department, but on May 26 the Post Office Department wrote Mr. Fechner as follows:

"No evidence of solicitation of or by postal employees, and no such evidence that the mails were used in the furtherance of a scheme to secure membership to a political club, was obtained."

As all evidence points to the fact that these solicitations were made and the movement organized by personal contact and word of mouth it was not to be expected that any such evidence of misuse of the mails would be discovered. Request for the evidence which was discovered if any, was met by refusal to reveal the reports of Post Office inspectors as confidential communications.

A similar report was obtained by Mr. Fechner from the U. S. Department of Justice, Mr. Fechner writes:

"I also wish to say that I have a letter from the Honorable Joseph B. Keenan, Assistant Attorney General, Department of Justice, in which he informs me that his investigators could find no evidence to support the charge that pressure or other improper influence was being exerted to secure financial contributions for political purposes from those engaged in C.C.C. work. If I can be of any further service please command me."

Since the abolition of the old Indiana Conservation Commission which operated on a nonpolitical basis for two decades or more under its Chairman Richard Lieber, and the dumping of all conservation activities into the Department of Public Works, a politically dominated organization, a situation similar to that created by this spontaneous burst of generosity on the part of federal employees to contribute to a state political machine, out of gratitude for what the party has done for them is a natural outgrowth of such conditions.

George B. Hills, Director of Finance for Florida, Democratic National Committee, on September 24, 1934, requested one per cent of the salaries of all office holders in Florida as a political contribution to wipe out the deficit for Florida in the Democratic National Campaign Fund, on the basis that it is a direct endorsement and contribution to the work the President is doing. Secretary Wallace circularized the department stating the contributions must be on a *purely voluntary basis.*

President Doumergue of France, on the same date, in his message to the French people said, "In reforming the French Government as to civil service, their salaries and advancement are assured. These workers are privileged and in return for their privileges they must submit to discipline and *not spend their time both in and out of office on political work.*" The New York *Times,* commenting on the Florida case called attention to the plight of Civil Service employees who endeavored to purchase favor in this manner with one administration, only to be faced in the future with the need for contributions to a succeeding regime.

The temptation to regard public pay rolls as future dependable sources of funds for defraying party expenditures, already pushed to its extreme in states like Louisiana constitutes a threat against public welfare which can no longer be ignored.

Conducted and organized in such a way as to escape the legal implications which were made the subject of court action

against the Governor of North Dakota, permitting the recipient of the invitation to "contribute" to infer anything he may wish to imagine; dropping hints, guarded or open statements as to the desirability of such enrollment; this levy upon office holders is nothing but a low form of political blackmail, degrading to professional technicians and subversive of the morale of any public service. The more despicable the political struggle for power, the more brazen becomes the substitution of jobs bought and paid for, and service by the favor of the party in place of merit, experience and technical efficiency. Such contributions, which are nothing but forced levies, regardless of the specious hypocrisy by which they are disguised as voluntary, strike at the foundations of honest government. The foresters who have regard for the integrity of their profession should seek to secure legislation that will furnish employees, whether federal or state, who make contributions, voluntary or otherwise, to political parties.

H. H. CHAPMAN, *Chairman*,
HARRIS A. REYNOLDS,
PHILIP W. AYRES,
ROBERT M. ROSS, *ex officio*,
Chairman, New England, Section.

BETTER CRUISING METHODS

Every forester is supposed to have the ability to transfer a square mile of timberland to a square inch of paper, and the skillful and intelligent accomplishment of this task is the objective of a great part of a forester's education. Following are some notes to show how the combination of the old methods, slightly changed, with the newer science of statistical analysis, has added new interest, reduced effort, and improved accuracy in one of the old foundation jobs of forestry.

Cruising should be an interesting problem worthy of the concentration of an expert and not a mechanical monotonous task. One of the ways of making it interesting and worthwhile is to encourage the cruiser to develop more and more into an expert timber estimator. Mechanically tallying diameters in the field and figuring volumes later in the office does not foster such a development. A man may work for months in a timber survey party, as an estimator, and at the end, he may have strong muscles and improved health but be little better prepared to "size up" a stand than at the beginning. In other words, he has not developed his judgment or trained his faculties to the full extent of the opportunity.

The problem is to change the system so as to bring about the desired result. I have found two ways to do it. First, a plan to enable the cruiser to arrive at his estimate of stand per acre while he is in the woods and looking at the identical trees for which he is calculating the volume. Second, statistical analysis of his results day by day, so that he knows when he has sufficient plots for a fair figure of average stand for each type, consistent with the amount of money he has to spend and the use to be made of his results. We are beginning to learn the futility of adhering to a 5 or 10 per cent cruise or some other fixed, preconceived standard of area to be covered by the cruise.

The modern idea is to recognize and map the timber types (the area factor) and then take enough samples in each type to satisfy the purposes of the cruise (the stand factor).

A specific case may make all of this a little clearer. A 3000-acre tract of timber in Northern Ontario was cruised

to determine the quantity of merchantable timber (mostly pulpwood) and its stumpage value. The only instructions were to get as good an estimate as possible within a period of two to three weeks. I thought that I should be able to come within 10 per cent or perhaps 15 per cent. This point was decidedly vague and could only be determined as the work progressed.

The first two days work, running through the equivalent of "forties" and taking ¼ acre sample plots determined the types to be recognized (the "universes" to be sampled). The types were black spruce, white spruce, jack pine and popple. The types were important in the order named and chief attention was paid to the first two. Table 1 shows[1] the analysis of plots as they accumulated.

The acres by types and average stand proved to be as follows:

	Areas of types	Average stand per acre cords
Black spruce	907	15
White spruce	251	15
Jack pine	866	6.5 (50 ties)
Popple	545	
Cedar	55	
Unmerchantable	302	
Total	2,926	

The estimate in the first three types was 23,000 cords; 15 per cent = about 3,500 cords. Assuming the average by types to be sufficiently accurate, a decrease in the maximum error to 7½ per cent would have meant increasing the number of plots in the three principal types from 187 to about 450, or nearly 2½ times. This would not have been as big a job perhaps as it may seem

TABLE 1

ANALYSIS OF PLOTS

Compilation[1]	No. of plots	Average per acre cords	Standard deviation cords	Standard error cords	Maximum error in estimated cords per acre + or —	Plots needed for maximum error per acre of 1 cord	Plots needed for maximum error per acre of 2 cords
			Black spruce type				
1	28	17.00	4.96	.92	2.76	225	56
2	39[2]	15.82	5.43	.87	2.61	269	68
3	63	15.80	5.40	.70	2.10	266	67
4	98	14.50	5.80	.58	1.74	306	76
After compilation No. 3 I decided that a 2 cord error in the average per acre would be satisfactory.							
			White spruce type				
1	16	11.78	7.22	1.80	5.40	480	118
2	30	15.40	7.70	1.40	4.20	543	134
3	35	14.90	7.40	1.25	3.75	502	125
			Jack pine type				
1	54	6.5	3.70	.57	1.71	125	31

[1]After compilation No. 3 I knew I had to be satisfied with a 4 cord error in this type.

[2]One plot of 37 cords had to be eliminated because out of line.

1. Reference should be made to Belyea's "Forest Mensuration," Chapter VIII, for explanation of use of the terms in Table 1.

TABLE 2

ACCURACY OF ESTIMATE

Type	Total number of plots examined	Per cent of total plots actually measured	Per cent of merchantable area actually cruised in each type	Maximum error in spruce estimates per cent + or —
Black spruce	98	65	2.6	12
White spruce	35	95	3.6	25
Jack pine	54	65	1.6	25
Popple	13	70	.7	
Miscellaneous	22	55	6.7	
Average of total	222	68	2.1	15

because an increasing number of plots could safely be "guess" plots as efficiently increased. However, in this case 15 per cent was considered sufficiently accurate.

Calculation of the cord volume of the plots on the ground was based on spruce volume tables converted into "trees per cord" for diameters and heights. The factor was varied according as the form class of the trees, in the judgment of the cruiser, varied. It is not a difficult task, by this method, to fix the cords per acre, by species, right on the ground. The tally man, upon completion of the listing of trees by diameters and species, calls to the estimator the number of trees of each diameter and species *per acre* (that is the actual recorded number multiplied by four). The estimator then consults his table and decides upon the proper converting factor based upon the heights and form class of the trees before him. The chances for error in this rapid calculation are more than offset by the obvious advantages.

The standard deviation of the average stand shows at once the degree of variability in the type chosen as the "Universe" and indicates those types where the average stand per acre is most difficult to determine. In the case cited an inspection of the standard deviations show that the jack pine type is most uniform, black spruce next and white spruce most variable. Therefore, except for the fact that the white spruce type was comparatively insignificant in area, it would have been necessary to measure a much larger number of samples in this type.

JOHN F. PRESTON,
Hammermill Paper Co.

BRITISH TIMBERMEN ORGANIZE TO COMBAT SUBSTITUTES

A form letter recently received by a New Orleans timber exporter from the Timber Federation of the United Kingdom reports the awakening of British lumbermen to the menace to their business of the substitution of other materials for wood and the organization of efforts to vigorously combat such substitution.

Briefly, the movement against substitution was inaugurated by the Executive of the Timber Trade Federation of the United Kingdom when he appointed a committee to survey the nature of the attack on wood by substitutes. The findings of the committee with regard to the ultimate result of continued attacks on wood, the apathy of the lumbermen during the early stages of substitution, and the importance of propaganda in the campaigns against wood were identical with what would be expected of a similar survey in the United States. As a result of the circulation of the committee's findings, however, there was founded in March, 1934, the Timber De-

velopment Association, Ltd., organized to maintain or increase the consumption of wood in Great Britain.

The objectives of the Timber Development Association are to conduct a general campaign in favor of wood, to resist vigorously and promptly all attacks on wood in the press, to create a bias for wood in the minds of architects, engineers, and other important wood users, and to oppose the association of the "modern" idea only with materials other than wood. These objectives will be attained through the use of paid advertisements in technical journals, through indirect publicity in news and editorial columns (the Association professes to have no illusions about the sacredness of these portions of the papers), through collection of favorable data on wood properties and uses, through distribution of other literature, through propaganda directed to engineers, architects, government authorities, and others, and through lectures and moving pictures to both technical and non-technical groups.

The Timber Development Association appears to be conceived in what we have been lead to consider the traditional British conservatism, with no modern adaptations or developments of wood suggested, no concessions, and plenty of simple old-fashioned fight on all fronts.

E. F. WHITE,
Forest Products Laboratory.

FOREST SURVEY STATISTICS AVAILABLE

Field work on the Forest Survey of the Douglas fir region has been completed and the first results have already been distributed in the form of mimeographed booklets of forest statistics for the 38 counties in the region, both as separates and in book form. Since this first distribution of basic inventory facts all of these data have been recapitulated into 10 tables (5 for each state), showing the amount of standing timber by species and the area of forest cover types by ownership classes.

An issue of Forest Research Notes (No. 13) embodies these 10 tables, recapitulating the basic inventory data for that part of each state in the Douglas fir region, prefaced by an explanatory text and a short summary and analysis by R. W. Cowlin, U. S. Forest Service, Portland, Ore., pointing out certain important features of the data. Copies are available upon request.

Further results of the Forest Survey will be shortly available. Forest cover type maps on a scale of ¼-inch-to-the-mile and of 1-inch-to-the-mile are in preparation. For forest units embracing two or more counties, additional statistics and textual discussion of the inventory, of growth and of depletion, together with an economic analysis of the whole forest situation, will be published as rapidly as completed.

SOME EFFECTS OF THREE ANNUAL FIRES ON GROWTH OF LONGLEAF PINE

Many who advocate controlled burning in the South as a means of forestalling disastrous accidental fires and improving forest range conditions, pass over the effects of the periodic fires on growth as negligible. To obtain data on this phase of controlled burning, measurement of three groups of plots in a second growth longleaf pine[1] stand was initiated by the Appalachian Forest Experiment Station in January, 1929. The stand had an average age of 31 years, a site index of 70 feet, and had not been burned over for at least 12 years. The density varied from 20 to 95 per cent of full stocking by basal area.

One group of six plots ranging from .1 to .3 acres each in extent and located in an area of 19.25 acres, was burned over under

[1] Pinus palustris Mill.

selected conditions soon after the 1929 measurement and again during the winters of 1929-30 and 1930-31. The other two groups, including also six plots in a portion of the same stand adjacent to the 19.25 acre area, were protected from fire during this period. A revision of the plan of work for the plots in 1932 made a reexamination necessary before the beginning of the 1932 growing season. The data gathered were analyzed to determine whether any effects of fire were reflected in the growth during the three year period.

Since the burned and unburned plots were not paired by density of stocking the effects of fire could not be determined directly. Accordingly the data for all plots were split up by 1/40th acre subplots which were then grouped by density of stocking classes. The mean basal area growth per tree inside bark at breast height and the mean height growth per tree were then computed for each subplot. These values, as well as the differences apparently occasioned by the annual fires are presented for the several density classes in Table 1.

From this table it is evident that in every density class where comparisons could be made the mean basal area growth (inside bark) per tree was materially less on the annually burned sub-plots, the reduction ranging from 36 to 75 per cent of the growth on the unburned sub-plots. The reduction in height growth is not so striking, although seven of the eight comparisons indicate an apparent reduction due to the fires.

In making a comparison of the basal area growth per acre on the burned and unburned plots the same number of burned and unburned sub-plots were chosen from each density class and grouped. The mean basal area growth inside bark per acre, for the three year period, on 34 unburned sub-plots was 10.428 ± .656[2] square feet, while that on the annually burned sub-plots was 6.049 ± .671[2] square feet. Comparing these values we find a deficiency of 4.379 ±

TABLE 1

COMPARISON OF MEAN BASAL AREA GROWTH AND HEIGHT GROWTH PER TREE FOR THREE YEAR PERIOD ON BURNED AND UNBURNED SUB-PLOTS OF DIFFERENT DENSITIES

Density class		Unburned sub-plots			Annually burned sub-plots			Deficiency on burned sub-plots	
			Mean growth per tree			Mean growth per tree		Mean growth per tree	
N. trees per sub-plot	b. a. sq. ft.	No. sub-plots	B. a. sq. ft.	Ht. ft.	No. sub-plots	B. a. sq. ft.	Ht. ft.	B. a. sq. ft.	Ht. ft.
1 — 4	0 — 0.15	2	.036	5.6	1	.009	4.0	.027	1.6
5 — 8		4	.029	7.7	5	.014	4.0	.015	3.7
9 —12		3	.025	7.2	5	.016	3.5	.009	5.3
12+		—	—	—	4	.016	2.9	—	—
1 — 4	.16 — .30	2	.045	6.8	6	.024	3.6	.023	3.2
5 — 8		9	.035	4.3	17	.022	3.6	.013	0.7
9 —12		9	.032	3.9	12	.020	3.5	.012	0.4
12+		2	.025	4.7	5	.014	2.6	.011	2.1
1 — 4	.31 — .45	5	.052	3.3	—	—	—	—	—
5 — 8		7	.047	3.9	4	.025	5.1	.022	+1.2[1]
9 —12		—	—	—	—	—	—	—	—
12+		—	—	—	—	—	—	—	—

[1] + indicates an excess rather than a deficiency on the burned sub-plots.

[2] Standard error of the mean.

.932[3] square feet per acre on the burned sub-plots during the three year period. This was a reduction of 42.0 ± 8.9 per cent. Since the deficiency was 4.7 times its standard error the chances that the reduction in growth was due to chance alone are only 1 in 500,000.

Comparisons were made of the growth of trees on these 34 sub-plots by diameter (inside bark) classes. In every diameter class except one (the eight inch class) the trees on the annually burned plots grew more slowly in basal area. This reduction was apparently correlated with size of tree, the larger trees showing a greater reduction in basal area growth than the smaller ones. However when the reduction in growth was expressed as a percentage of the basal area growth on the unburned plots no correlation was apparent.

The reduction in height growth appeared to be negatively correlated with size of tree, i.e. the reduction was usually greater on small trees than on large ones both in actual values and in percentages.

A. L. MacKinney,
Appalachian Forest Exp. Sta.

British Forestry Journals

While the United States has only one technical and professional forestry journal, Great Britain has several—the *Quarterly Journal of Forestry*, of the Royal English Forestry Society; the *Scottish Forestry Journal*, of the Royal Scottish Forestry Society; *Forestry*, the Journal of the Society of Foresters of Great Britain, and the *Empire Forestry Journal* of the Empire Forestry Association.

In view of the current criticism of the policy of our own Journal of Forestry it is worth while examining the British journals as to policy and content. The latest number of each was therefore studied. In general, the British journals stick pretty close to technical forestry with as wide a range of subjects as does our own Journal, except that several give utilization more prominence than we do. In only one of the current issues is the social aspect of forestry given some prominence. There follow some specific comments:

The *Quarterly Journal of Forestry* for July, 1934, contains 80 pages of text. Starting with a 5½ page editorial, "Is Tidiness a Vice," in which the Editor shows that tidiness on the farm and tidiness in the forest are two different things, e.g., when tidiness removes the forest litter it becomes a vice. The editorial really amplifies the leading article, "Natural Growth in Plantations," a purely "silvicultural" article. (The editorial for the previous quarter was on "Marketing Timber," a subject our American forestry editors hardly dare editorialize.) The second original article, "The English Landscape and Its Preservation," is adequately described by its title, though it includes both roadside and forest beauty. Next comes "Notes on the Woodlands and Plantations of the Isle of Man Forestry Board," describing plantations. Then "Annual Rings in Transplants and Seedlings," with some excellent photomicrographs of the cross sections of seedlings, illustrating how thin sections will help the silviculturist unravel the mystery of obscure growth rings. Then follow several brief notes, thus: "Damage by Woodpeckers"; "Wind Damage on Scots and Corsican Pine"; "The Monkey Puzzle Tree"; "Northern Forestry Products, Ltd." Then three brief reviews, a few pages of Society notes and a description of an excursion by a group of foresters.

[3]Standard error of the difference.

The *Scottish Forestry Journal* for March, 1934 (published half-yearly), contains 103 pages, plus 39 separately numbered pages devoted to affairs of the Society itself. There is no editorial. There are 14 articles as follows: "The Production and Marketing of Pit Props"; "Home Timbers for Mines"; "Board of Trade Returns of Timber Imports, 1933"; "Forestry Recollections: A Beginner's Experience in Forestry"; "The Soil in the Practice of Forestry"; "An American Civilian Conservation Corps"; "Telegraph Poles: Their Production, Preparation and Preservation"; "Laying Off Rides by Prismatic Compass"; "Creosoting"; "An Error which Arises in the Use of Sample Plots"; "Forestry Abstracts" (Reviews of periodical literature); "A Forester's Study of Scottish Moorland"; and "Notes and Observations on the Conifer Root Aphis." Several pages on "Notes and Queries" follow and then there are 13 brief reviews.

The June, 1934, number of *Forestry* is a book of 88 pages. There is no editorial. Six excellent articles, several quite technical and lengthy, constitute the original contributions. Their titles are "The Nation's Forests: I. The Forest of Dean"; "Corsican Pine in Great Britain"; "The Soils of the Teindland State Forest"; "The Form of the Stem in Coniferous Trees"; "A Cytological Method of Distinguishing *Salix alba* var. *Coerulea*"; and, "The Fascist Government and the Restoration of Italian Forests." There are 8 excellent reviews and 3 brief notices.

The *Empire Forestry Journal* for July, 1934, is a book of 182 pages plus 9 pages of half tones; of the half tone pages one is a portrait, 4 depict silviculture, 2 picture sawmills and 2 illustrate the effect of properly and improperly ground planer knives. The first ten pages are given over to brief editorial notes, many of them of a personal nature—appointments, obituaries, etc. But we find one expressing concern over the appointment of only laymen to the Forestry Board of South Australia, thus, "It is almost incredible that in these enlightened days a Forestry Board should be appointed without . . . apparently anyone with any practical knowledge of the subject." In another the Editor reports an upheaval in New South Wales forestry circles and says "If there is any undertaking which demands continuity and conservatism in management it is Forestry . . . ." Another editorial reports the establishment of a pulp and paper mill in New Zealand, and another the formation of a timber development association. In commenting on Canada's forest resources the Editor remarks "It is to be hoped that the ninety years' supply in sight will not cause the authorities to take up too supine an attitude. The annual destruction of forest is tremendous, and in view of Canada's own development and the almost certain call on her, as one of the world's main storehouses of softwood timber, to supply increasing quantities to other countries, it would seem that even greater efforts at conservation than have yet been attempted are indicated." Editorials like these will please our JOURNAL's critics but what would they say to the Editor's making editorial comment on the incursion of steel into the domain of timber? The Editor expresses alarm over the inroads of steel mine props and cross ties. He gives data on the displacement and adds "These are startling figures. . . ., (and) ten firms have taken up the manufacture of stainless steel furniture. . . . . Facts like these are certainly a call to action and suggest that the appearance of the Timber Development Association has perhaps been too long delayed." It is difficult enough in America to get our forestry purists to even understand that successful forestry is contingent upon a sustained large scale use of wood let alone daring to risk their wrath by giving the matter editorial attention.

There are 9 general articles occupying 61 pages. The titles are worth listing; "Some Ecological Conceptions"; "Forestry and Unemployment Relief in Western Australia"; "A National Plan for American Forestry"; "Forestry and Tsetse Control in Northern Nigeria"; "Some Economic Aspects of Timber Production in Malaya"; "Empire Timbers in 1933"; "The Importance of Correct Cutting Angle in Machining"; "Statistics: Imports of Timber to the United Kingdom"; "Some Notes on the Pines of Mexico." It is in the Reviews Department that this JOURNAL is particularly strong. In 92 pages there are reviewed 16 annual reports and 67 general bulletins and publications.

No comments are offered. A simple examination of the titles in each of the British Journals will indicate to the fair-minded reader that the British have a broader viewpoint of the implications of forestry than those in our Society who have held their own JOURNAL OF FORESTRY up to scorn.

EMANUEL FRITZ,
University of California.

BIOCLIMATOLOGY

In the last few years a new branch of science has made rapid progress, namely, Bioclimatology. The connections between life, climate and weather are very close and new investigations are being carried on at many research stations. In realizing this the German Meteorological Society will meet the demand for a proper place to publish such results by issuing a quarterly annual magazine *Bioklimatische Beiblätter der Meteorologischen Zeitschrift*" (Bioclimatic Supplements of the Meteorological Magazine), Publisher F. Vieweg u. Sohn, Editors Dr. F. Linke, Frankfort, Germany, and Dr. W. Schmidt, Vienna, Austria.

This new magazine will publish original papers on the above mentioned subjects; that means in the field including the borderline between medicine, botany, zoology, ecology on the one side, and climatology and meteorology on the other side. Besides this, reviews of general interest and abstracts of all new publications in these fields will be given. This will encourage the readers of this magazine to send reprints of their current publications for review to the undersigned.

H. LANDSBERG,
School of Mineral Industries, State College, Penna.

FIRE CONTROL IN THINNED AREAS

Part of the public and all forest officers have been greatly concerned over the fire hazard caused by the enormous amount of slash left from thinning projects in young ponderosa pine stands, and the control and suppression of fire in the slash areas.

Recently we had two small fires in ponderosa pine stands. In each case the fire ran from an unthinned area to a thinned area where the slash was comparatively heavy on the ground. Each one was a fair example, furnishing reasonably conclusive and identical answers to the question under discussion.

The first fire at Sanitor, south of Custer, started from a dump ground at the edge of dense unthinned young reproduction at the bottom of a steep slope. The fire crowned and ran through the unthinned reproduction rapidly, spotting quite a distance ahead. Control line could not be built fast enough in the unthinned reproduction. The fire ran out into thinning slash where it travelled

much slower, burned with less intense heat, and finally came down to the surface enabling men to work close to the fire line. The fire did not crown after running into the thinned area. The tops of a few trees in the thinned area were burned out, but in nearly every case these trees were at the crest of a ridge or on a high point where the heat from each side caused them to burn, but the fire did not travel through the tops.

Generally, in unthinned ponderosa pine areas dead and down timber was completely burned, as were many stumps. In thinned areas, generally, the dead and down material was not burned and in many cases the stumps had only been scorched without becoming hot enough for the fire to penetrate into the roots.

The slash on the ground was cut in early November on the one fire area and in September on the other fire, making the slash a little over six months old. It was quite dry. Nearly all the needles were brown with only a tinge of light green in a very small percentage of them. The older slash was all brown.

On north slopes the main stems of the slash were scorched to the point of charring the bark. On south slopes the slash was burned more, the smaller branches and tips of the stems being burned off. In each case the fire passed quickly over the slash leaving a comparatively small amount of material burning behind. In spite of drouth the moisture content of duff under slash is certain to be higher than that of duff uncovered.

From the place of origin of the second fire the topography sloped generally to the east at an average of nine per cent. The fire readily crowned all the way to the bottom of the drainage spotting ahead as far as twenty-five chains. The eastern exposure was mostly unthinned. Nearly all of the opposite side of the draw was thinned. The fire was controlled in the thinned area rather easily, whereas attempts to stop it in the unthinned area were unsuccessful. After getting into the thinned area the fire did not spot ahead, and men could work much closer to the fire line, making control more sure and quicker.

The construction of fire line through the thinned slash was comparatively easy, and accomplished much faster than in unthinned reproduction. Fewer man-hours are required to construct a given amount of fire line in ponderosa pine slash areas (with proper brush disposal) than in unthinned reproduction, because it takes less time to drag out the slash than it does to cut a lane of sufficient width through reproduction. Mopping up was much easier in the thinned areas, where there was less burning material on the ground and less fire in roots under ground.

In summarizing the advantages and net gain in reduction of fire costs and hazards, we have drawn the following conclusions, based upon the two examples described:

1. Ordinarily fire will not crown in thinned ponderosa pine areas, because, with a few rare exceptions such as very steep slopes and very high wind velocity, the crowns of trees properly thinned are too far apart to carry a crown fire. Furthermore, there are still enough trees left standing to break the wind at least partially; and, with proper brush disposal, the slash has sufficiently settled by the time it is dry enough to burn readily to keep fire from mounting to the tops of the trees.

2. Fire will not travel as fast in thinned ponderosa pine slash as in unthinned reproduction.

3. Fire is easier controlled in thinned slash.

4. Fire is easier and more rapidly mopped up in thinned slash.

5. Suppression costs are reduced.

6. The acreage burned is likely to be reduced.

7. In general, reproduction thinning projects in ponderosa pine stands bring about a net reduction of the fire problem.

Wm. T. Vaughn,
Harney National Forest,
South Dakota.

Distribution of Moisture in Pines

The article entitled "Resin Concentration in Loblolly and Slash Pines," by Bishop and Marckworth, in the December 1933 issue of the Journal of Forestry (pp. 953-60) was of particular interest to the writers. In this article reference is made to tests conducted to determine the moisture content of pines by the use of the auger method. For the past six years investigations have been made on the moisture content of healthy and beetle-attacked shortleaf pines in the Southern Appalachian region, and the results obtained are not in accordance with the findings of the above-mentioned authors.

Among the conclusions reached by Bishop and Marckworth are the following:

The average resin content of the sapwood of second-growth loblolly and slash pines is least in the base, and increases in going up the tree into the crown.

Preliminary investigations seem to show that a decrease in resin content is correlated with an increase in moisture content, and vice versa.

The moisture content of the sapwood of second-growth loblolly and slash pines, taken over a period of time, is the same and averages 41 per cent based on the total (green) weight of wood and moisture.

The following comments are made:

A comparison of methods of sampling logs and trees for moisture content shows that determinations made from auger borings are lower, by an average of 21.3 per cent, than the more desirable cross-section determinations (oven-dry basis).

The moisture content of the wood of healthy shortleaf pines is lowest at the base and highest at the top of the tree, increasing in nearly a straight-line correlation from 78 at the base to 184 per cent (oven-dry basis) at the top. This is an average of ten trees. Later results from approximately 75 trees follow the same trend. This is directly opposed to results obtained by Bishop and Marckworth. This same relation is also known to exist for pitch pine (*P. rigida*) and scrub pine (*P. virginiana*).

Preliminary investigations indicate that the moisture content of shortleaf pine is higher in the spring and summer than in the fall and winter.

More extensive tests to check the preliminary results are now under way. Attention is being paid to the amount and distribution of moisture in the various rings as well as that relating to seasonal variation. It is anticipated that these results will be published in the near future. A paper on a comparison of several methods of making moisture determinations in standing trees and logs is now in manuscript form.

R. A. St. George and
B. J. Huckenpahler,

Laboratory of the Bureau of Entomology, U. S. Department of Agriculture, maintained in coöperation with the Appalachian Forest Experiment Station, Asheville, N. C.

Clean Cutting of Ponderosa Pine versus Selective Cutting

Studies recently completed by the Northern Rocky Mountain Forest Experiment Station have shown conclusively that the maximum net return per acre is obtained by economic selective cutting.

Based on clean cutting a specific area of all species and economic selection of the pine only from this same area, the following comparison of net return per acre is obtained:

Method of cutting	Amount logged per acre net log sale		Net return per acre	Net return per M based on net volume logged
	Ponderosa pine	Fir and larch		
Clean cut all Species	13,560	1,670	$30.17	1.98
Economic selection pine only	8,450	0	40.72	4.82

Logging of the low value fir and larch and all small sized pine up to 20 inches, as well as cutting of all pine above this size without regard for defect or quality, is largely responsible for the lower return per acre under clean cutting.

The net return under an economic selective cutting practice was $10.55 per acre greater than the return per acre from a clean cut. A decided advantage in favor of this type of selection. However, the advantage of economic selective cutting is probably shown in a much more startling manner by a comparison of production costs. On the study area a net return of $40.72 per acre was produced for a production cost of $195 per acre for economic selective cutting. The net return of $30.17 for clean cutting was produced at a cost of $365 per acre. In other words the economic selective cutting practice produced a net return 29 per cent greater than the net return for clean cutting at only 54 per cent of the production cost of clean cutting.

Wage scales, working hours, and cost protection prices established under the code have a direct influence on the minimum sized profitable tree. Recent studies have indicated that in actual practice minimum cost protection prices are in reality only a protection of production costs. On the clean-cut plot referred to in the preceding tabulation the code values that were applied to the lumber yield should have been 17 per cent higher to allow a margin of $2.50 per M for stumpage and 15 per cent for profit and risk. However, under economic selection the average selling value of the lumber was already increased materially through wise selection of trees for quality. This average selling value only needed an increase of 4 per cent to allow a margin of $2.50 per M for stumpage and 15 per cent for profit.

I. V. Anderson,
Northern Rocky Mountain Forest and Range Experiment Station.

Western Forestry and Conservation Association to Meet

December 4th and 5th have been selected as the occasion for the deferred 1934 annual meeting of the private, state and federal forest agencies, which for 25 years, have, under the auspices of their grand lodge or clearing house, the Western Forestry & Conservation Association, held such a conference for the purpose of coöperation as far as may be.

Private, state and federal agencies, including Canada, responsible for forest fire, forest insect and all other forest ownership problems, from Denver to the Coast, will gather in Portland on this occasion.

Forest Service Reports Start of Work on Shelterbelt

Preliminary work on the 1,000-mile Great Plains Shelterbelt Project has begun, with men now in the field making detailed surveys of location, soil conditions, tree types, and other factors.

The sum of $1,000,000 has been made available by a decision of the Comptroller General following an earlier decision withholding the original $15,000,000 allotment. Since the project represents a progressive experiment to ameliorate adverse natural conditions the full result of which can not yet definitely be stated, the money available will be concentrated largely on work of an exploratory character. Plans and methods will be developed for extending the work on such scale as Congress may decide.

Administrative offices for the shelterbelt project have been opened at Lincoln, Nebraska, under Acting Director Paul H. Roberts, in place of Assistant Forester F. H. Morrell, who has returned to his previous post in Washington. Forest Service research men at the Lake States Forest Experiment Station are working on the technical phases of the program under Raphael Zon.

Pack Fellowships to be Awarded

Announcement has just been made by the Charles Lathrop Pack Forest Education Board that it is now receiving applications for its sixth annual award of fellowships for training leaders in forestry.

The purpose of these fellowships is to encourage men who have shown unusual intellectual and personal qualities to obtain training that will best equip them for responsible work, either in the general practice of forestry, in the forest industries, in the teaching of forestry, in forest research, or in the development of public forest policy.

Approximately six fellowships will be available this year, and will range from $500 to $1,500, although in special cases higher sums may be authorized by the Board. Appointments may be made for twelve months or for longer or shorter periods, in accordance with the scope of the work, and may be renewed at the discretion of the Board. The amount of the grants will in each case be determined by individual circumstances. Fellowships will ordinarily be restricted to men of American or Canadian citizenship. There are no restrictions as to age, educational status or personal experience, but ordinarily fellowships will be granted only to those who have finished an undergraduate college course or its equivalent.

The awards will be made to men who demonstrate natural powers of intellectual and personal leadership and who intend to make forestry their life work. Special emphasis is placed on character, intellect, imagination, industry and personal interest in forestry. The Board seeks all possible information concerning candidates from former teachers, associates, employers, and others.

Appointments will be made by the Board on recommendation of a Committee on Appointments, consisting of Henry S. Graves, John Foley, and Tom Gill.

Applications will be received by the Board until December 31, 1934, and should be made on forms supplied by the Board. Application forms, as well as further information regarding the fellowships, may be had from the Secretary of the Board, Tom Gill, 1214 Sixteenth Street, N. W., Washington, D. C., or from the following Directors of the Board:

Samuel T. Dana, Dean, School of Forestry and Conservation, University of Michigan, Ann Arbor, Michigan; John Foley, Forester, Pennsylvania Railroad, Philadelphia, Pa.; Henry S. Graves, Dean, School of Forestry, Yale University, New Haven, Conn.; Wm. B. Greeley, Secretary-Manager, West Coast Lum-

bermen's Association, Seattle, Washington; Arthur Newton Pack, Director, Charles Lathrop Pack Forestry Trust, Princeton, New Jersey; E. O. Siecke, Director, Texas Forest Service, College Station, Texas; Ellwood Wilson, Acting Professor of Silviculture, New York State College of Agriculture, Ithaca, New York; Hugo Winkenwerder, Dean, College of Forestry, University of Washington, Seattle, Washington; Raphael Zon, Director, Lake States Forest Experiment Station, St. Paul, Minn.

One Fire Problem Solved

A fire occurred on the Cut Foot Sioux District of the Chippewa National Forest that was completely different from any other fire that had ever occurred in that region. The fire occurred in a stand of aspen poles with a heavy understory of brush. There was very little ground vegetation present. The forest floor consisted of a heavy mat of hardwood leaves which had been compressed into a compact layer by the snows of the previous winter.

An examination of the burn indicated that over an area of approximately 2 acres a great number of small fires had occurred. It was estimated that there was a least one small spot fire to every 6 sq. ft. or 500-700 fires in all. A few spot fires had attained a size of several square feet, but the majority of them were very small, ranging in size from 2 to 6 inches in diameter.

An analysis of the situation showed that obviously the fires must have been man-caused. Inasmuch as the complete area was burning in spots when discovered, it was also evident that all of the spot fires must have started almost simultaneously. It was difficult for us to conceive how any person or persons with any type of instrument could have ignited the fires simultaneously. The possibility of the use of some chemical sprayed over the area was considered. Was it possible that an aeroplane had ejected burning oil? These and other solutions were discarded as being improbable.

The solution which was evolved by piecing together bits of information from the men working on the fire is as follows: It was noted that the forest floor on adjacent areas was covered with a thin film of "aspen cotton," formed by the accumulation of a great number of aspen seeds together with their thin hairy or cottony attachment. This film of "aspen cotton" over the forest floor was highlv inflammabel and when ignited would spread fire almost as rapidly as gun powder.

The "aspen cotton" was ignited probably by an unextinguished match or cigarette butt, or possibly, by an extracted cartridge from a rifle. It was ascertained that a party of 2 or 3 young men had been hunting woodchucks in that locality that afternoon for which there is at present a bounty of 15 cents.

The "aspen cotton" had accumulated into a continuous film due to the lack of rain during the seeding period of aspen. We had experienced an unusually dry spring with a period of almost one month without any rain at all. In normal years the "aspen cotton" would not have a chance of accumulating to such a density for the rains would obliterate it.

The fact that such a film of "aspen cotton" can accumulate in a very dry spring is of very serious moment to us in the North Central Region where we have many stands of aspen. In the past we have considered our aspen types as constituting one of our lowest fire hazard. In such a dry spring as we experienced in 1934 our aspen types may jump from very low fire hazard types to very high hazard types.

Gerald S. Horton,
U. S. Forest Service.

REVIEWS

Ovragi, ikh Zakreplenie, Oblesenie i Zapruzivanie. (Erosion Control: The Gullies, Their Stabilizing, Afforestation, and Terracing). By E. E. Kern, *Professor of Moscow College of Forestry. Seventh edition. 1926.*

Professor E. E. Kern, well known Russian authority on erosion control, deals in this book with the very serious problem of gullies, especially in the steppes region. He mentions a great number of solutions to the erosion problem, including the damming of gullies, terracing, and forest planting. In connection with the proposed shelterbelt program in the Middle West by the United States Forest Service, his general considerations concerning the effect of the forest on climate and soil are very interesting.

The following extract from Chapter II, in which Professor E. E. Kern develops the concept of the great importance of afforestation to the plain region of Southern Russia, is an almost exact translation.

One of the most important reasons for drought in Southern Russia, with consequent loss in crops is the lack of forests. The forest manifests an effect on soil and winds. The roots of the trees hold the soil and prevent water from washing it away. The crowns of the trees reduce wind velocity and protect the fields from cold and dry winds. The forest helps keep the snow on the fields by preventing it from drifting into depressions and ravines.

The forest also reduces the force and damage of snow storms, the velocity of dry winds, and the number of dust storms. The dust storms do the greatest damage in the spring when the winter wheat is still small and the stems are weak. The top soil is blown away and carried by the wind for considerable distances, covering the crops, railroads, and highways like a blanket of snow.

The most disastrous dust storm occurred in the steppes region in the spring of 1892. The trains were unable to move as the rails were covered with top soil (Tschernesem). Hundreds of thousands of hectares (one hectare approximately 2½ acres) of crops were destroyed. The wind not only blew away the small shoots, but the tiny particles of the wind-carried soil struck the leaves and stems with such force that they were broken, and even the exposed root hair systems were destroyed. The germinating seeds were uncovered and blown to other sections of the country where they died. Tremendous areas were stripped of vegetation; even the prairie grasses were destroyed, and the once grass covered steppes became as barren as a desert. The boundary ditches of the Great Anadol Forest, 1½ meters (4½ feet) deep, extending north and south, were filled with top soil. Drift fences on the Mareupol Railroad were also covered. The importance of a forest was well illustrated along the eastern boundary of the Great Anadol Forest. Here the elm trees 1 meter (3 feet) in height on the edge of the woods were completely buried by the top soil. But going into the forest the amount of deposited soil diminished to such an extent that at a distance of 25 meters (80 feet) from the edge of the forest there was no visible evidence of a dust storm. Inhabitants of the region insisted that the wonderful crop harvested on the western

side of the forest was due to the wind break of the trees.[1]

Snow sheltered from the wind and sunlight in the forest lies upon the ground for a longer period of time than in the open fields. Consequently the snow melts slower and the forest soil covered by moss and humus absorbs a large portion of the melting snow or precipitation.

Under the canopy of the trees the water evaporates considerably slower than in the open. The forest soil prevents too rapid drainage; streams and fields are provided with water the year round by forest springs supplied by moisture held in the moss and humus of the forest floor. An entirely different situation exists where there are barren gullies and ravines. The swift rushing water from the melting snow drains the needed water from the fields, deposits the washed away top soil in rivers, and destroys bridges and dams.

In the forest four-fifths of the precipitation reaches the soil; one-fifth evaporates from the leaves, branches, and trunks of the trees. This proportion varies with the intensity of the rain fall. In heavy rain fall the leaves of the trees bend and more water reaches the soil than during a light or steady rain. The crowns of the trees break the force of the rain, thus preventing erosion in the woods.

If rain occurs after hot weather, the trees are cooled by the rain fall, but not at once, the trees remaining at a higher temperature than the falling rain for some time. The rain vaporizes and the vapor rises to a cooler upper stratum where it again condenses and falls. This rapid process of vaporization and condensation continues as long as there is a notable difference in the temperature between the trees and the falling rain. Therefore it rains for a longer period of time and the rain falls with less force in the forest than in the open field.

In the summer and during the day the air temperature in the forest is lower than in the open fields. The difference between the temperature in the field and in the forest becomes greater as the temperature increases in the fields. During the cool period of the year and at night the air temperature drops more slowly in the woods than in the open fields; therefore the temperature in the woods at this period of the year is higher than in the fields. During the warm period of the year the trunks of the trees are at a lower temperature than the surrounding atmosphere, while in the cold months the situation is reversed. The leaves of the trees are always at a lower temperature than the surrounding atmosphere due to the radiation and transpiration of the leaves. During the day for all periods of the year the air temperature in the crowns of the trees is warmer than at the base; during the summer the air temperature in the crowns of the trees is lower than that in the open fields.

The above mentioned difference of air temperature in the woods and nearby fields is the cause of air currents moving from forest to fields and vice versa. As a result of these different temperatures during the summer days there are two air currents: one moving near the soil surface from the woods to the fields (the cooler forest air moves to the fields); the other, an upper current, moves from the fields to the forest in the same plane as the tree crowns. As the air temperature increases, the air currents also increase in force. After sunset the situation changes; gradually the same two currents (upper and lower) reverse directions.

The air currents resulting from the different temperatures in the open field and in the forest during different periods of the day and year have their favorable influence on neighboring localities. The

[1]This information was obtained by Professor V. V. Dokouchaev while on an expedition to this region.

eat of the summer diminishes due to the act that hot and dry air penetrating into he forest becomes cool and more humid; he high temperature in the field is reduced by the cool air current from the orest, this air becomes more humid, and y it, the field is protected against intenive radiation during the night. The same urrents help to form dew and fog in the ocalities adjacent to the forest. In the pring and fall the same currents protect ields from early frosts and it is also uite likely that the forest protects the earest localities from hail storms. The orest like a large water basin balances he extremes of temperature, reduces overeating and radiation of the soil, and at he same time increases the moisture in he soil and the humidity of the air.

It is known that dry air increases soil emperature during the summer and day, ut reduces it during the winter and night. n the other hand, humid air covering the round retards radiation and rapid cooling of the soil; the more humid the air, he better the protection. The relative umidity of the air in the forest is always igher than in the open fields; this difference is more noticeable in the summer nd in the mountains. Therefore in the orest not only the free water, but also he soil moisture, evaporates considerably lower than in the open field. The forest oil absorbs moisture rapidly and drains lowly, and for this reason is a very imortant source of moisture. Clear cutting f the forest causes higher air and soil emperature and results in more rapid vaporation and therefore reduces the oisture in the soil and produces extreme limatic changes. Clear cutting reduces he forest to fields, steppes, and barren reas; thus man changes climatic condiions and at the same time the flora and auna of the region, new plants and anials appearing in place of original forms.

As we have already noted the relative umidity of the forest air is higher than hat of the field; consequently the air in the forest is nearer to the saturation point than in the field, and the probability of precipitation in the woods is greater. Above the overheated steppes the clouds move rapidly, rise higher, and do not condense; for the temperature of the hot air is too high and the moisture capacity is very large; hence the clouds rise higher and higher and in the end disappear, and clear, blue skies are above the steppes for months at a time. But quite different is the condition on the steppes where there are scattered forests or large basins of water. The temperature of the air above them is not so high, the air is more humid, and its saturation point is lower—both being more favorable conditions for condensation and precipitation. The temperature, lowered still further by rain, induces lower temperature in adjacent fields, creating a condition here suitable for rainfall which previously existed only above the forest.

The amount of precipitation within the forest is greater than in the forest edge, which in turn has a higher precipitation than that in the surrounding districts. This fact was proved by many years of forest meteorological observations in France, Russia and Germany. Observations which were taken continuously near Nancy, France, from 1866-1899, show that for every 100 units of precipitation in the interior of the forest, there was only 93.9 on the edge of the forest, while at a distance of 10 kilometers (6.2 miles) from the border of the forest precipitation amounted to only 76.7 units.

The increase in precipitation in the forest is not dependent on the time of the year or on the direction of winds. It takes place equally during rainy periods and dry years.

SERGE N. KOULICHKOV,
J. MUNNS,
Northeastern Forest Experiment Station.

Identification of the Timbers of Temperate North America. By Samuel J. Record. *John Wiley and Sons, New York. 1934. $3.00. 195 pp. 47 figs., 6 pls., 16 tables.*

This book supersedes Prof. Record's *Economic Woods of the United States*, John Wiley and Sons, 1919, and has the same general arrangement. Part I is entitled "Anatomy and Certain Physical Properties of Wood" and Part II, "Timbers of Temperate North America."

Part I furnishes general knowledge of wood and a familiarity with the terminology necessary for the manipulation of a descriptive key. It is not confined to a consideration of the woods of temperate North America. Included are brief discussions of tree classification, gross anatomy of the tree, histology, and cell wall structure. Cell wall pits, the several wood elements, and rays, tyloses, and intercellular canals are very well discussed, and illustrated with excellent photomicrographs. The remainder of Part I covers the gross characteristics of wood, i. e., ripple marks, growth rings, heartwood and sapwood, texture, grain and figure, color and lustre, scent and taste, and specific gravity. Woods with anomalous structure are briefly discussed at the end of Part I. There are 16 tables scattered through the text which for the most part are lists of woods or families in which certain features occur.

The descriptive key of Part II contains a total of 80 specific groups of timbers of temperate North America. It is the indentation type of dichotomous key. Physical characteristics as well as macroscopic and microscopic features are used for the descriptions. Superscript numbers following the names of the important woods in the key refer to a section of "Notes and References." Each of the brief notes gives additional information on the tree and the wood, such as, range, form, trade names, properties and uses and is followed by several references. The last section is a list of 110 general references. There are six plates at the end of the book showing a forest map of the United States and 36 photomicrographs of typical woods.

Prof. Record's excellent use of English and his brief, clear style of presenting technical material might well be used as a model by writers of text books. Particular emphasis is placed on terminology in the text, and a liberal use of footnotes is well made. On the whole the arrangement is very good, except that "Woods with Anomalous Structure" seems out of place treated in a separate section at the end of Part I. The author has shown the common origin and the tendency to intergrade of tracheids and wood fibers by combining their discussion under one section. It would seem that treating these two important elements separately as was done in the old book would make their concept more definite. The illustrations in the text are mostly photomicrographs which are splendid examples of microtechnique and photomicrography. The section of notes and references is a valuable addition to the key, but its brevity and lack of uniformity and incomplete bibliography make it much below the standard of the other parts of the book.

The rewriting of the book justifies a change in the name, because besides bringing the technical knowledge up to date, the author has changed the character of the book materially. However the reviewer thinks that the new title is misleading. The book takes in more territory than the identification of the woods of temperate North America. As the author states in the preface, Part I deals with the whole field of wood anatomy and contains much more information than is needed for the use of the key. Many of the examples in the text

nd many of the illustrations are not of emperate woods. Only one of the tables confined to temperate North American mbers. The book is really a work on ood anatomy with a key for temperate lorth America included. It affords aid the classification of many woods not overed in the key, including some non-ommercial and tropical woods. A broad-r title would have been more fitting.

As compared with *Economic Woods f the U. S.*, this book is more adapted advanced study and research reference nd less to elementary class work. Be-inners and those whose forestry curri-ulum affords only one course in wood dentification might find a text with such ide reference confusing. The former ook had most of the data on unimpor-nt or exotic woods tucked away in the ack in an appendix. Whereas, the old ook had a dearth of photomicrographs, did contain some splendid line draw-ngs that are helpful in explaining diffi-ult microscopic features to the un-amiliar. These have been left out of he new book.

In general, this book is the author's *Economic Woods of the U. S.* rewritten ith the new technical knowledge of the ast 15 years applied to the text and he key and transformed from an under-raduate class manual into a scientific ext book.

HEREFORD GARLAND,
California Forest Experiment Station.

The Tropical Subsistence Homestead. By John C. Gifford, DOE, Professor of Tropical Forestry, *University of Miami, Coral Gables, Florida, 158 pp., Books, Inc., New York, Boston. 50 cents.*

The vital relationship existing between orestry and agriculture in the tropics has never been sufficiently appreciated by foresters of the north temperate zone, and it has probably never been directed to our attention as forcibly as in Professor Gifford's unusual book, *The Tropical Subsistence Homestead.*

"Any tropical country," he tells us, "that bases its prosperity upon field crops, such as cotton, tobacco, sugar, or corn, will in time lose one. The tropical zone is for many reasons a tree country, and any people that develops it from the annual crop standpoint will in time lose although many places because of their pristine riches and careful cultivation, last a long time." The tropics contain a thousand illustrations of the truth of this.

The chief purpose of the book is to plead the cause of the tropical subsistence homestead, which has been in Professor Gifford's mind for forty years. "The furtherance of the tropical forest subsistence homestead has been and I hope always will be uppermost in my mind. It seems to me about the most essential thing that can give life and comfort to the majority of our people, in fact, the only permanent way out of the difficulties which beset the world. The small farm home is the essential basic unit of society. The best nations of the world are not those with the greatest natural resources, but with the largest number of small, self-supportive, free of debt home sites."

The author would make available for each family in the south an area of about five acres, supporting beneath a protective cover of forest and fruit trees enough agricultural crops to make each family self-supporting. His thesis is that since the only source of wealth is the soil, if we divide the productive areas of the earth equally we have actually divided the wealth of the world, and we have given each one a share in the only true wealth that exists. He points out the practicability of the subsistence homestead for our negro population as well as for the Seminole Indians.

Whether or not this country can ever be induced to accept a Rousseaunian "back to nature" alternative for the none too satisfactory industrial civilization that now surrounds it lies in the realm of prophecy. Whether or not the tropical subsistence homestead idea will ever be made available for more than a small portion of our population, it is at least intensely practical for making self-dependent and self-respecting a great portion of our population that can never hope for such self-respect and self-support from an industrial system in which unemployment is increasingly becoming a normal situation. There is a world of homely wisdom that informs the book, a wisdom that has to do not only with trees but with humanity, and a great love for that simple, child-like and laughter-loving people that live down in the Antilles.

There is also a wealth of information having to do with the tropics, its historical background, and the behavior of trees. The very delicate biotic balance that exists in tropical woodlands—a balance so easily destroyed and with such difficulty restored—is well described. "The term, 'forest conditions' is full of meaning, and is really the heart of silviculture, although difficult to describe. It means the proper density of shade, a moistness of atmosphere, a lushness of growth, and a rich surface covering of humus in which many creatures, plant and animal, are living in more or less harmony. It is filled with the odors of dank earth, the perfume of flowers, and even the songs of birds or the chirpings of bugs. They are living together on a fair give-and-take basis—in fact, a house sufficient unto itself, a well ordered colony protected from excessive sun and rain and nurtured by dew at night. The nearby fields are sunbaked in dry weather and muddy and eroded in the rainy season, where cultivation is entirely artificial, and where the equilibrium of nature has been completely upset by the hand of man."

Professor Gifford's suggestion for demonstrating these subsistence homesteads is interesting. "Each city should have a five-acre sample subsistence homestead for park purposes right in the midst of its other business activities. In this area of five acres there should be planted little groups in close formation, congenial mixtures of all the useful trees, bushes and vines that grow in the tropics. There should be a typical house, containing all the products of the land on exhibition: samples of food, drinks, fibers, medicines, oils, balsams, resins, gums, cabinet woods, fodders, and countless other things produced by the tropical forest."

A chapter on Article X of the Lumber Code, and a chapter of "Concluding Aphorisms," conclude the book.

One may not agree with Professor Gifford in bringing the tropical subsistence homestead forward as a panacea to most of our environmental ills, but whoever reads this book will find it refreshing, provocative, terse, epigrammatic, and, as I have said, redolent of good, earthy wisdom—of a wisdom that has been lived through—and of a love for human things and for the forests that befriend them.

TOM GILL,
C. L. Pack Forestry Trust.

Empire Forestry Journal. *Empire Forestry Assn., Grand Bldg., Trafalgar Square, London. Vol. 13, No. 1. 1934.*

This issue announces the retirement of Mr. J. S. Corbett who has been secretary of the Association since its inception in 1921, the death of Lord Novar, the first chairman, and the retirement of Sir John Stirling Maxwell, chairman since 1933, who is succeeded by Lord Stonehaven.

There is the usual large and varied amount of material: 16 notes and mis-

cellanea, 16 reviews of annual reports from the Dominions and Colonies, no less than 67 general reviews, and 11 articles. While most of this deals primarily with forestry in the British Empire, it is by no means confined to the Empire, and a great deal of it is of general interest to foresters in all countries.

In an article on "Some Ecological Conceptions," R. Bourne takes issue with Clements view of the climatic climax, which he calls the Monoclimax Theory. Instead of a single climax for a given climate, Bourne considers that differences in mature soils bring about different vegetation climaxes, and that these are "all edaphic climaxes and of the same status." Since all ecologists agree on the need for stability, "the real tests of a climax are stability of topography and maturity of soil profile in relation to climax, as well as the presence of climax dominants." He stresses the need for recognizing the effects of disturbance, and cautions against confusing "fossil soils," that is, relics of a previous climate, with mature soils of the present era. Taking into account immature soils, he considers that "every topographic site or soil is potentially a climax habitat" until proved to the contrary; that "for every potential, mature site, a distinct climax is expected.*** To the ecologist, these climaxes, however similar or dissimilar, should be as distinct as species are to the taxonomist." In order to reconcile the differences between the Monoclimax and Polyclimax theories he recommends ranking Clements' climatic climax with unit vegetation regions, such for example as Northern Temperate Conifer Forests, and "recognizing that the vegetation of each such region would result, in the absence of disturbance, in a series of distinct climaxes." It is rather interesting that at about the same time as Bourne's article appeared, the *Journal of Ecology* had a paper by Dr. John Phillips of South Africa upholding Clements' concepts.[1]

S. J. Kessell, Conservator of Forests, gives an interesting account of the way in which unemployed have been used in forestry work in western Australia, in making thinnings in planting, building roads and fire lines, and other work. The method of thinning mallet (*Eucalyptus astringens*) is described in detail.

In "Forestry and Tsetse Control in Northern Nigeria," J. R. Ainslee presents a remarkable example of methods which have been successful both in improving the forest and in reducing the numbers of the tsetse fly. The natives were brought in from their scattered plots throughout the forest and concentrated on areas of good arable land. This gave more open space around the huts, and therefore reduced the contact between man and tsetse. Also it benefited the forest by checking the shifting cultivation. The other step was early firing in the forest, as a result of which several hundred square miles, formerly tsetse infested and dangerous for grazing, have become largely tsetse-free and desirable grazing reserves. Early firing also brings about a market improvement in the forest: several areas with only 50 stunted trees per acre have developed 400 to 500 mostly young trees per acre in four to ten years. Just how this is brought about is not explained, but the key to success seems to be the correct timing of the firing in relation to a number of elements, such as the occurrence of the monsoon, the stage of the vegetation and the life history of the tsetse fly.

J. N. Oliphant, in "Some Economic

[1]Phillips, John, Succession, Development, the Climax and the Complex Organism: An Analysis of Concepts, Part I. Journ. of Ecology, Vol. 22, No. 2, pp. 554-571, 1934.

Aspects of Timber Production in Malaya," shows the difficulties encountered in ascertaining the wants of the high grade market and in organizing production to meet these wants. Then, every cubic foot of high grade timber produced means finding a market locally or in neighbouring countries for 8 or 9 cubic feet of inferior material.

C. C. Robertson continues his series of articles on the cultivation of Mexican pines in South Africa, and deals with *Pinus Apacheca, P. Engelmann, P. Arizonica* and *P. Ponderosa.*

BARRINGTON MOORE.

Praktische Anleitung Zur Waldwertrechnung. (A Practical Introduction to Forest Finance). By Leopold Hufnagel. *Julius Springer, Wein, 1934. pp. 62. 3.80 RM.*

This small text is considered justified because it includes only such formulae as are used by the administrative foresters. The preface also states that the elementary student is scared by the formidable textbooks that consider finance a science and present formulae that have never been used in practice.

The book is divided into three parts, the first section dealing with the several methods of forest valuation; the second describes the practical application of these formulae to the various types of problems that arise in forest administration and the third part, of seven pages, covers the question of financial return.

In presenting the usual formula for expectation value the author points out that Hundeshagen over a century ago stated that no one should own forest property who was not satisfied with 2 to 3 per cent interest on his investment. A table is presented, prepared by Spiegel von Peckelsheim, giving the maximum interest that can be earned by various species on the several site classes. Spruce at a 70 to 100 year rotation and on Site quality I can earn the maximum, 3.3 per cent, whereas Beech on Site V and a rotation of 100 to 120 only 1.8 per cent.

The discussion in Part 2, covering 22 pages, indicate that the author has faced the problems of forest valuation in the field; he clearly points out the difficulty of valuing forests—the difference in value of large and small parcels; the meagerness of representative transactions, the other than economic factors that influence prices, etc. He takes up separately the methods used in evaluating forests for specific purposes such as for insurance, for loans, for settlement of an estate, etc.

Then follows a brief but clean explanation of the taxes to which forests in Germany are subjected and the methods used in determining them: the land tax, based upon old out-of-date net income data ignores differences in actual forest stand and cultural methods, the income tax and the property tax. To arrive at property tax values where management plans are not available such as is the case for nearly all farm woodlands a series of tables based on age, three generalized site classes and a .7 stocking have been prepared. For instance, on medium site pine in the 60 year age class is valued at $40.50.

Those who read German will find this volume worthy of a place among their reference books.

P. A. HERBERT,
Michigan State College.

Forêts et Neiges. (Forests and Snow) By P. Harlé. *Revue des Eaux et Forêts, Vol. 71, No. 4, April, 1933 pages 249-256.*

The insufficiency of the usual statement that the forest retards the melting of snow

was demonstrated by numerous periodic measurements of depth of snow during the winters of 1930 to 1932 at 5 sets of stations above 1,000 m. in the high Pyranees. Each forest station was paired with a nearby open station of the same altitude and aspect.

As a result of interception by the crowns, the forest soil received less snow than that in the open. The deficit in single storms amounted to 6 to 8 cm. under stands of *Abies pectinata.*

In considering the influence of topographic location, cold exposures, where the effect of forest on rate of melting may be either accelerating or retarding, must be distinguished from warm exposures where alone the forest definitely retards melting. In the latter situation at the beginning or end of winter or in exposures to the sun or warm winds, the rate of melting was found to be less in the forest by from 1 to 9 cm. per day.

The influence of the forest on snow accumulation and melting was less marked for deciduous than for coniferous stands.

The author's emphasis on the need for study of forest influences in the mountains in winter and particularly on the importance of distinguishing between different exposures and between different parts of the snow season, is timely. He apparently is not familiar, however, with the work of Church[1] in western Nevada and adjacent California who has shown the influence of forest on snow conservation and especially the benefit of an open forest of glades where the snow accumulates heavily in the openings but is protected from direct insolation and the consequent losses. Church's work, moreover, is based on water equivalent of the snow and thus avoids the necessity of assuming that snow densities in the forest and in the open are the same. Actually reductions in depth of snow may sometimes be due wholly to changes in density rather than to actual passage of water into the soil.

J. Kittredge, Jr.,
University of California.

Lightning Storms and Fires on the National Forests of Oregon and Washington. By William G. Morris, *Pacific Northwest Forest Experiment Station, Portland, Oregon. June, 1934. 27 pp. mimeographed, illustrated.*

That lightning causes more than one-half of all the forest fires on the national forests of Oregon and Washington is sufficient justification for the long and expensive study undertaken by William G. Morris. An annual average of 750 fires in these states has been attributed to lightning. Because lightning fires cannot be prevented, the forest protectionist can endeavor only to achieve a high degree of preparedness and a system of prompt detection and suppression.

Morris' study was directed towards the discovery of "the fundamental characteristics of lightning storms and the fires they start,—and some of the basic information needed for effective lightning storm forecasting."

The investigation was based on 6,000 systematic reports of lightning storms in Oregon and Washington, as seen by U. S. F. S. lookouts from 1925-1931. Storms over approximately 25,000,000 acres of forest land were studied to obtained data on size, duration and formidability.

Lightning storms in the Northwest, unlike the isolated cumulo-nimbus storm clouds of the eastern states, may cover an entire sky in a path 40 miles wide.

[1] Church, J. E. 1933. Snow surveying: its principles and possibilities. Geog. Rev. Vol. 23, No. 4, pp. 529-563.

These western storms are separated into three categories according to extent. "General storms," the largest and most dangerous, are responsible for an average of 35 fires per day in the national forests. "Local storms" average but one fire per storm day. "Intermediate storms" cover a territory between the general and local in extent and average nine fires per storm day.

Although no definite lightning storm lanes or "breeding spots" were found, the chances of storms occurring after intermediate or general storm days, preceding which there have been two days of no intermediate storm, was computed to be 4 to 10.

The danger period appears to be between ten A. M. and ten P. M. from July 1 to September 10, more than 90 per cent of the lightning storms occurring during these hours. The general storm days developed night and early morning storms more frequently than did the local storm days. During general storms there are more cloud-to-ground flashes than during local storms.

From more than 5,000 tabulated reports it was discovered that needles and duff were the most important kindling material. Trees and snags were other important lighting fuels, whereas grass and brush were of minor importance in most areas.

Lightning storm movement was studied, as a possible means of storm forecasting. Most often the movement was towards some northerly direction. The direction of movement is usually about the same for most storms on any given day, as is the length and rate of movement, although the following day these characteristics may be entirely different.

Forecasting has reached the point where it is possible to estimate the hour when a storm, already in progress, will reach a given locality by platting and timing its movement during the early part of its course.

Morris' contribution to forest protection in the Northwest should be of great value in determining the feasibility of rearranging and establishing emergency lookouts and fire-fighting forces in times of possible stress. His work might well be a pattern for further study in the Northwest and in parts of California, Nevada, Arizona, and New Mexico where similar atmospheric conditions obtain.

ALBERT G. HALL,
Pa. Dept. of Forests and Waters.

Logging—Principles and Practices. By Nelson Courtlandt Brown. *John Wiley and Sons, New York. 1934. 284 pages. $3.50.*

In announcing this book, the authors and publishers make it plain that it "is supplementary to a companion book (soon to appear) on log transportation devoted to the principal methods employed in minor and major transportation in which special attention has been given the tractor, motor truck and power skidding as well as the principles and methods of major land and water transportation." The present volume treats chiefly of regional methods of logging (and does so admirably) preceded by an elementary discussion of the historic and economic background of logging and by chapters on "Forest Labor and Housing," "Felling and Preparation of Logs for Transport" and "Selective Logging."

The author's wide experience, both here and abroad, fits him admirably for the task. He has wisely condensed his material so as to preserve a clear-cut picture of the various phases of logging. The forest school student and the graduate forester will get from this book what he

most needs, namely, a lucid idea of *what* are the principal processes involved in logging.

Masterly is the treatment of regional logging practices. Up to the minute and copiously illustrated with *new* figures and photographs, the text, in the final three-fifths of its contents, takes up the logging practices in the following regions (each with appropriate sub-regions totaling sixteen):

Pacific Coast (including British Columbia)

Southeast

Rocky Mountain

Eastern (including Canada).

For each of these regions the following points are covered:

1. General
2. Principal commercial types with leading and secondary species and stands per acre
3. Stumpage values
4. Periods of logging
5. Labor; hours of employment, wages, etc.
6. Camps
7. Topography influencing logging methods
8. Climatic conditions affecting logging
9. Felling and bucking practice
10. Skidding methods
11. Log loading
12. Log transportation to mill or market
13. Chief forest products

The material presented is exceedingly valuable and for the first time (so far as the reviewer knows) brings into a single brief compass the essentials of *regional* logging practice.

The book concludes with a copious bibliography arranged subjectively.

It is almost gratuitous in a work of such obvious timeliness and value to select material for quotation. The following must suffice, showing how well the author understands the interplay of economic forces in the forest industries and their effect on forest management.

"Forest utilization constitutes the major part of the forestry operations practiced in this country. Until our virgin forests shall have been depleted and prices shall have risen sufficiently to invite the practice of forest management on a sustained yield basis, the great problem in our commercial forests will be the complete and efficient utilization of our standing timber. With second growth forests producing wood at a ripd rate, the per capita consumption of wood decreasing, and the persistent and increasing use of substitute materials, it seems possible that we may have sufficient supplies of wood for the needs of our people for at least several decades."

"Companies that bought logs as needed, or small mill operators who purchased logs or stumpage from time to time, have generally been more successful financially than those who attempted to safeguard their investment in woods and sawmill equipment against rising stumpage values by the acquisition of large bodies of standing timber. American business enterprises have generally felt the necessity of protecting their investment by the assurance of a future supply of raw materials. It has been indicated that there has been some doubt of the wisdom of this policy in the lumber industry. It is also an argument in favor of governmental control of standing timber and its release as the markets can readily absorb it."

The critical eye of the reviewer finds little to pick on in this well-printed text. Perhaps the author, a graduate of the Yale School of Forestry, thought that Sir William's name is really "Schlick" (in the old song it rhymed with "thick"). Again, he inadvertently speaks of "a 100 to 110 year cycle" in Idaho for western white pine "with a plan to log the timber selectively each 30 to 35 years." What he

means is a *rotation* of 100 to 110 years and a cutting cycle of 30 to 35 years.

Unfortunate are the repeated inaccurate references to the Lumber Code, as for example: "the approval of the Forest Industries Code" (p. 10); the statement that, "the hours and wages of woods labor have been fixed for each region since 1933 by the National Recovery Act" (p. 54); and the reference to "conditions existing prior to the National Recovery Act Code in 1933" (p. 116). These slips will no doubt be corrected.

Great praise is due Professor Brown for having written a book at once readable and authoritative on a subject with which most foresters are insufficiently familiar. The book fills a long felt want in forest schools,—more than that, it will be hailed by lumbermen, by timber operators generally and by practicing foresters, because it deals understandingly with a subject that is, after all, fundamental to all forestry practice.

A. B. Recknagel,
Cornell University.

Die Schrägpflanzung (Slant Planting). By Prof. Dr. E. Münch. *Wochenblatt der Landesbauernschaft Bayern 124 (11):378-379, 1934.*

Planting trees in a slit in the sod so that the tree is almost prostrate has been abhorrent to every American forester. Trees tucked under a lap of sod this way usually died of drought because they were loose; roots were crowded, and whoever heard of a tree growing that way, anyway? It looked badly. It now appears that Prof. Münch has found trees planted in a slanting position turn erect and grow equally well, if not better, than trees planted erect. Of course they must be planted well, and firm. It is claimed that the weight of the sod and soil itself pressing down tends to keep the roots in close contact with the soil better than in plants set vertically; then too, the subsoil has not been disturbed to break the capillary column of moisture moving upward to the surface. It might also be added that the roots are kept up in the layers of the soil richest in humus, and where roots of conifers naturally belong. Deep planting, burying the roots in infertile and poorly aerated soil is often hard to avoid if trees are to be set tight. In Prof. Münch's experiments several hundred thousand trees have been planted slanting and survival and growth ascertained to be equal to that of erect-planted stock. The plants turn erect in a few weeks in the case of Scotch pine and in a year in stiffer spruce transplants.

Henry I. Baldwin.

SOCIETY AFFAIRS

More about the Journal's Editorial Policy

In October our Society Affairs Section was given over entirely to a consideration of the editorial policy of our magazine, centering around the Petition to the Council of June 13, 1934. In this issue also we are devoting a relatively large amount of space to the same subject in the form of supplemental letters or statements from some of the signers of the petition, as follows:

1. Raphael Zon's letter of June 28, to President Chapman, with which he transmitted the petition.
2. L. F. Kneipp's letter to me of July 27, 1934.
3. Raphael Zon's letter of August 16 to President Chapman.
4. Robert Marshall's statement, entitled, "Should the Journal of Forestry Stand for Forestry?" and comments thereon by President Chapman and Former Editor-in-Chief Emanuel Fritz.

It is understood that other signers of the petition are also preparing for publication supplemental statements presenting their respective points of view. They will be taken care of, as they come in, in the December and January issues, insofar as the physical limitations of space will permit. The same consideration, within the same limitations, will be given other members of the Society who may wish to publish their views. Please remember that the closing date for the December number is November 10 and for the January number, December 10.

At the Society's annual meeting, January 28-30 in Washington, this vital issue will be scheduled for as thorough discussion as possible during the business session, which at present is planned for the second day. Every member is urged to come to the meeting fully prepared to take an active and constructive part.

In this connection reference is made to President Chapman's statement on page 777-781 of the October number and to his digest of the replies to my circular letter of July 18. These replies, now totalling well over a hundred, have been mimeographed. Any member who wishes to read them in full is welcome to a set as long as the supply lasts.

Franklin Reed, *Editor-in-Chief.*

Professor H. H. Chapman, *President,*
Society of American Foresters.

Dear Chapman:

A small group of fellows and senior members of the Society asked me to transmit the enclosed letter to the individual members of the Council.

The petition to the Council has been written in a spirit of utmost friendliness. It is not the intention of the group to embarrass the Council in its decision by any outside pressure; no other distribution, therefore, is made of this petition and no publicity is given to its contents.

Any communication that I may receive from you concerning the matter presented for your consideration will be transmitted by me to all the members of the group that signed the petition.

Faithfully yours,
Raphael Zon.

Mr. Franklin Reed, *Executive Secretary,*
The Society of American Foresters.

Dear Reed:

Your letter of July 18 is received.

As one of the subscribers to the petition of June 13, probably all now required of me is an explanation of the considera-

tions which inspired me to indorse the petition. They were two, namely:

1—Comparatively recent events and trends justify the fear that an activity minority of the membership of the Society, by the aggressive presentation of rather specious issues, can gain control, and with it can enjoy more than its equitable share of the columns of the JOURNAL in the presentation of its opinions and viewpoints. There might be no studied rejection of other viewpoints or opinions; there simply wouldn't be space for them after the "administration" had satisfied its space requirements.

2—The improbability that any secretary of the Society can so completely separate the editorial function from the "job" demands of the secretaryship as to fully realize the inspirational potentialities of the JOURNAL. This does not mean that the secretary's desire to retain the job will cause him to subordinate his ideals and intellectual freedom to that objective, but simply that the secretarial functions will demand so much of his time that he may follow the line of least resistance and be satisfied with less than the best attainable quality or balance of subjects or may hesitate to accept contributions which, by provoking wide-spread differences of opinion, will not only add greatly to his labors but may also inspire certain elements in the Society to question his orthodoxy or suitability for the job.

This second point, in my opinion, is supported by some of the comments that have been made on the petition of June 13, which offer as a telling argument the query as to the degree to which the subscribers to the petition have offered articles for publication in the JOURNAL and have been denied the privilege of publication. That somewhat begs the question. Few editors of worth while publications are content to publish only the material that voluntarily is offered to them. On the contrary, they analyze the tastes, desires, and needs of their readers, work up a balanced program, and then arrange for the preparation of the material by the best available writers; who then can engage in its preparation with reasonable assurance that their efforts will not be wasted.

Forestry, as I see it, is no longer a cult dominated by a Robin Hood spirit but a serious profession dedicated to the promotion of human welfare through technically determined and organized applications of certain natural and economic laws. Basically, it is motivated by a spirit of social service and by individual desire to work creatively and constructively for the advancement of mankind. But these fundamental purposes are apt to become obscured in a cloud of technical or administrative minutia and thus lose their dominating significance to the individual unless they are vivified in somewhat dramatic and appealing ways through appropriate media and at appropriate intervals, if not continuously. One valid criticism of the JOURNAL is that it does not sufficiently meet this need. The old analogy of inability to see the forest for the trees seems quite apropos. The JOURNAL has been centering too much attention on the trees and not enough on the forest.

Perhaps it is presumptuous for me to suggest my own tastes as illustrative of the desire of the average member of the Society, but I would assume that said "average member" would have four broad fields of interest as follows:

1—The technique of his profession: New principles, formulae, methods or discoveries in the fields of silvics, dendrology, mensuration, pathology, entomology, utilization, economics, etc.

2—The intellectual, social, economic, and political status of foresters, both as a professional group and as individuals; and the means whereby both the group and individual, by wholly ethical and proper means based upon service and ac-

complishment, could gain increased recognition, opportunity for wider and more important creative service, and commensurate social and material rewards.

3—The economic relationships of forestry, their articulation with other major economic functions, their implications and consequences in terms of a balanced national economy; the effectiveness and appropriateness of what foresters are doing or plan to do in relation to what other professional or economic or political groups are doing or plan to do.

4—The social implications of forestry and, as a concomitant, the political implications of forestry, using the term in a governmental rather than a partisan sense; the degree and ways society is dependent upon forestry for the preservation of its institutions or for its cultural advancement and economic liberty; the principles or courses or measures of action which society must adopt if forestry is to serve society as it should; and the forms in which such principles or courses or measures must be expressed legislatively or politically and/or administratively if the essential objectives are to be attained.

Without making an analysis of past issues of the JOURNAL it is my strong impression that there has been a great deal of space devoted to No. 1; considerably space allotted to certain but not all aspects of No. 2, much less to No. 3, and still less to No. 4. To me, at least, the petition of June 13 was an appeal for a better balanced ration; to which end it was proposed to have an intellectual dietitian rather than an overworked general practitioner.

Very sincerely yours,

L. F. KNEIPP.

PROFESSOR H. H. CHAPMAN, *President,*
The Society of American Foresters.

Dear Chapman:

This is the first chance I have had for a long while to answer your letter of July 24.

I have not been giving much thought to any possible candidate for the Editor of the JOURNAL and, strange as it may seem, I do not recall that our group as a whole considered this matter or planned to urge the candidacy of any one single person. As the Council is committeed to continue the present arrangement until January, there is, as you say, ample time to consider the matter.

There is one point, however, on which I would like to permit myself to comment. There is apparently a conviction on the part of many members of the Executive Council that the Editor should be a paid man, and a highly paid man. With an Executive Secretary and a well equipped office to take care of the mechanical side of the printing, the Editor's job does not seem to me such a formidable task. Among my friends on the University Campus there are several outstanding scientists, busy with teaching and research, and yet very proud of being editors of technical journals within their fields. One happens to be a physicist and the other a chemist. They are not paid editors.

I never could understand why Fritz, for instance, had to give so much of his time to the editing of the JOURNAL unless he tried to do what the office of the Executive Secretary could very well do for him, namely the mechanical chores that go with the editing of a magazine. The function of the Editor of the JOURNAL lies, in my opinion, more in giving direction and tone to the publication than editing or correcting papers submitted for publication. He has at his disposal a staff of Associate Editors, experts in their respective fields, to whom could be left the job of passing on technical papers.

The often made statement that the editor merely publishes what is submitted to him does not show, it seems to me, a proper conception of an editor's job. An editor must be alert to the trends of

his time, and be able to discern the important movements from the temporary and illusory. Through his contacts and knowledge of most of the men in the profession, he should attempt to seek out and solicit opinions, comments, and contributions on the momentous happenings in forestry. The best accomplishment in any profession rises out of a love, interest, and enthusiasm for the work. In the old days, foresters were willing to undertake tasks at personal sacrifice and I believe a similar spirit still exists in the profession.

To me, therefore, the contention that the appointment of an Editor separate from the Executive Secretary is linked with the ability of the Society to pay for his services strikes me as entirely commercial—an admission that the Society has no men in its midst who would be willing to render services without consideration for pay. I don't believe it.

Very sincerely yours,

RAPHAEL ZON.

SHOULD THE JOURNAL OF FORESTRY STAND FOR FORESTRY?

Last June I joined with eleven other members of the Society of American Foresters in a formal protest to the Executive Council against the recent unsocial editorial policy of the JOURNAL OF FORESTRY. It so chanced that during the course of the summer I met the two men who have edited the JOURNAL during the past four years. One protested indignantly and the other almost tearfully about the great injustice we had done them. They seemed so upset that I wondered whether I could have been guilty of a grave mistake. Perhaps it was all an illusion on my part. Perhaps the JOURNAL was still battling as courageously as of old for a policy which would end forest destruction, which would give the general public a cheap and plentiful supply of wood, and which would preserve the incalculable values of the forest for soil and water conservation and for recreation.

When I returned to Washington I rushed up to the Forest Service Library for the purpose of checking on my doubt. I made a one- or two-sentence summary of the main point of each of the 32 editorials which have appeared in the JOURNAL during the four years since October, 1930. Of course it was a little hard to get the point of a few editorials, and perhaps another person's summaries might be slightly different, but on the whole I think there would not be a serious disagreement should anyone else set himself the same task which I have just completed. At any rate, the following are the dominant points which each of the last 32 JOURNAL editorials have made to me:

October 1930—The National Timber Conservation Board, sponsored by the lumber industry to help solve its business problems, should be helpful to the cause of forestry.

November 1930—This year's annual meeting will be an exceptionally interesting one, and foresters should make a special effort to attend.

December 1930—The recent importation of Russian lumber and pulp suggests the danger that if the Five Year Plan is successful Russia may take our lumber market away from us, that even her present small scale dumping of cheap wood on our markets is discouraging to the timberland owner who wants to practice forestry, and that "nothing could hurt forestry more than a policy of reservation" of our own virgin timber supplies.

January 1931—Let us plant 10,000,000 trees to commemorate the two hundredth anniversary of George Washington's birthday, but in doing so we should not imply there is any threat of timber shortage.

February 1931—The thirtieth annual meeting of the Society of American Foresters made us proud of what a splendid profession it has grown to be. Of special interest were papers delivered by private foresters which clearly showed "the interdependence of forest production and forest utilization, that silviculture is a means and not an end, and that the profits or other benefits of private forestry must be demonstrated *by foresters* to win its practice on privately owned lands."

March 1931—We need lots of demonstration areas to prove to private owners that forestry, if it is "circumscribed or free from frills," may be "well within the confines of commercial limitations."

April 1931—The popular demand for planting trees on submarginal farm lands is a fallacious one because "it would make the private timberland owners' problems that much more acute," since there would thus be an additional supply of timber to compete for markets. Furthermore, planted areas require protection and thus would spread our inadequate fire protection funds even more thinly than they are spread at present.

May 1931—The report of the Committee on the Conservation and Administration of the Public Domain comes to an unsound conclusion in recommending that the public domain be turned back to the states, but it does serve a useful purpose in stimulating discussion.

October 1931—The large area of tax delinquent cut-over and farm lands indicates that some program of economic rehabilitation should be undertaken by the states and counties. The forester should help in giving forestry advice, but principally he should guard against the danger of spending too much money on forestry.

November 1931—American business man, and especially lumbermen, who have a little money to spare should buy up small tracts of forest for the purpose of playing with various forestry methods as a hobby and not to make money, just as gentlemen farmers play with agriculture as a hobby and not to make money.

December 1931—If a large program for relieving distress among the unemployed should be undertaken this winter it should be a work relief program which would include a cleanup of dead material, simple improvement cuttings, and erosion control. It should not be a reforestation program.

January 1932—New York has done a splendid thing in authorizing an appropriation of $19,000,000 to purchase and reforest 1,000,000 acres of land.

February 1932——Foresters, who are in better standing with the public than is the lumber industry, should urge on Congress the desirability of modifying the anti-trust laws so as to reduce competition and control prices.

March 1932—"The South probably has more genuine large-scale forestry accomplishment to its credit than any other forested region in America," and this is due chiefly to a few courageous lumbermen who have practiced it voluntarily.

April 1932—We should straighten out the confusion in nomenclature for ponderosa pine, Douglas fir, and the balsam firs.

May 1932—Foresters should not object to a reduction of appropriations for the sake of economy. Forestry will "accomplish more of fundamental and substantial significance under the calming stress of curtailment than under the nervous tension of expansion."

October 1932—The death of James William Toumey and William Willard Ashe is a great loss to the forestry profession, which has profited immensely by their inspiration and knowledge.

November 1932—The field of forestry has been constantly broadening since the profession was first organized in the

United States, but our leaders have not kept pace with this growth.

December 1932—We should substitute the severance tax for the antiquated property tax on virgin forests, although it will probably be best not to couple this change with any forestry requirements.

January 1933—Franklin D. Roosevelt is a splendid practical forester, and it is exceedingly fortunate that such a man is about to become President of the United States at this crucial period for American forestry.

February 1933—The public should buy at a fair price the forest land upon which the private owner can *not* afford to practice forestry and at the same time operate it profitably himself, unless "we can devise an even better way than reacquisition, one that would make private ownership profitable to the owner and desirable to the public."

March 1933—In the early days of forestry the recreation and soil and watershed protection values of the forest were understressed, but now they are overstressed. "If forestry is to survive as a distinct profession it must have a product to grow and to sell, and foresters must learn to believe in and promote the use of that product."

April 1933—"It would appear that it is as important for foresters to keep their eyes on the markets for secondary wood products as it is for them to develop tree growing. . . . Without faith in wood, be it in the form of lath, sash or other product, our faith in forestry is a snare and a delusion."

May 1933—Foresters devote too much energy to propaganda and too little to practice. It is hoped that they will repudiate this idea by writing articles for the JOURNAL telling of their concrete accomplishments.

October 1933—The leadership of the forestry movement has failed to take effective steps to end forest destruction. "We now need a Federal Forest Council which will unite the governmental, associational, educational, scientific, and industrial groups into a cohesive whole," and which will embark on an effective program of long range planning and action.

November 1933—Article X of the Lumber Code furnishes a golden opportunity to forestry, and even if this does not materialize into anything tangible, "it has at least given to forestry a far more important place in the economic and social scheme of things than it ever held before."

December 1933—Regional sustained yield is only a distant goal which we cannot hope to attain for years to come, but individual owners are actually practicing sustained yield, "something to be recognized, encouraged, and aided."

January 1934—We should *discourage* the present huge expenditure of funds for forestry purposes, unless the taxpayer, who is the source of all wealth, feels that he is getting his money's worth from his contribution.

February 1934—The annual meeting this year was run on the new plan of discussing only a few topics but discussing them thoroughly.

March 1934—Many defeatists, afraid of large expenditures, are scared that the forestry profession is trying to do too much, but "it will not be the defeatists who carry the banner forward, but those who make themselves the targets for the shafts of criticism and from these very attacks learn the paths which lead to ultimate success."

April 1934—It is imperative that we should establish without delay professional forestry standards.

May 1934—The insistence of the present administration that men appointed to emergency forestry jobs must have political endorsement sets up an intolerable situation which if continued will

break down the high standards of the public forestry organizations.

Perhaps just as interesting as this long resumé of what the editorials do say would be a short analysis of what they omit. In this analysis, as well as in all the remaining portion of this article, I shall exclude the editorials of October 1933, March 1934, April 1934 and May 1934. These were not contributed by the two editors, and they adopted a more public spirited attitude than the editors were willing to take. Nowhere, aside from these four editorials, was I able to find any outcry against the forest devastation and deterioration which continued rampantly in every forest region in the country throughout the four years covered by these editorials. There were only one or two mild proposals to solve the terrific forest fire problem, and although this problem cannot possibly be met except by large appropriations of money, there were four different editorials either lamenting the use of too much money for forestry purposes or applauding the curtailment of forestry funds. The value of the forests for anything except the production of commercial products was minimized and nowhere were the interests of the consumer or the public even hinted.

From a combination of what was said and what was omitted I have tried to express what appears to have been the editorial ideology of the JOURNAL OF FORESTRY for the past four years. I use the the word *appears* with certain reservations, because there were so many conflicts in viewpoint that one sometimes imagines the editor must have tossed up a coin to see which side of a question to favor. For instance, we are told to guard against spending too much money on forestry in March 1931, October 1931, May 1932 and January 1934, while we were told to applaud the expenditure of large sums in December 1931, January 1932 and March 1934. However, leaving out of consideration the hopelessly conflicting expressions, it seems to me that this in general is what the JOURNAL has been proclaiming for the past four years to be the viewpoint of professional forestry in the United States:

"The way to establish forestry practice in America is to make forests scarce. By this means the demand for wood products will exceed the supply and it will be possible for the lumber and other wood-using industries to boost prices and make a substantial profit for themselves. Some of this profit they will voluntarily invest in forestry to grow more trees to sell at a profit. The big need is obviously to get rid of our present excessive timber and with this goal in mind nothing could hurt forestry more than a policy of reservation. The public planting of trees is also pernicious because every foot of timber grown that way will tend to reduce the desired timber shortage. Conversely, we should disregard the inevitable facts that the high price of wood brought about by the economy of scarcity will unquestionably reduce demand, that it will force the further invasion of substitutes into the already heavily invaded wood market, that it will be harmful to the consumer whose purchasing power is limited, and that in the destruction of our present timber supply, which is necessary to make forests scarce, there will also be destroyed inestimable values in soil and water conservation and in beauty."

Is this exaggerated? Not a bit! Read the four years of editorials yourself and see if you come out very differently. The official publication of the American forestry profession stands brazenly for forest depletion!

After all, it is the old issue between public welfare and private welfare. Thirty years ago foresters were militantly and unequivocally on the side of public

welfare. Today the JOURNAL, mouthpiece of professional forestry, is just as unequivocally for private welfare. Forestry is only justifiable if it can bring a profit to the owners of wood-using industries. The highest welfare of this specially privileged minority deserves more consideration than the highest welfare of 125,000,000 people. For this large class plentiful timber, low prices, and the stopping of devastation, are obviously desirable. Yet the JOURNAL OF FORESTRY calls for a scarcity of timber, high prices, and remains silent on stopping devastation.

If such an editorial viewpoint is to continue to come from the official mouthpiece of the Society of American Foresters, then frankly I have no interest in remaining a member of that organization. However, I do not believe the majority of Society members favor the editorial expression of the past four years, and I have confidence that they will demand in the future an idealism as intense as that which at the turn of the century started American forestry on its splendid career.

ROBERT MARSHALL.

COMMENTS ON MARSHALL'S ARTICLE

I have reread the editorials from October 1930 to May 1934, quotations and digests from which were cited by Mr. Marshall. I find one, that of April 1931, with which I would disagree.

It is true that many of these editorials discuss the problems of private forestry. To me it appears logical and sane to devote editorial space to unsolved problems of huge import, and which have been made the subject of the most widely discussed and controversial measure of the present administration, under the N.R.A. Mr. Marshall in his recent book, has shown his disbelief in and rejection of private enterprise in forestry in favor of a totalitarian program of public ownership and operation of forests and forest industries. With this viewpoint, he has selected phrases from certain of these editorials which for the most part I find do not convey the spirit of nor do justice to the editorial in question.

I regard his summary of the purport of these editorials as not only exaggerated but highly imaginative. A few of the ideas of which he accuses the editors were on one occasion published by Mr. Wilson Compton in the general press, but certainly not in the JOURNAL. I was not aware, and I do not believe other members were aware, until informed by certain of the signers of the petition, that the JOURNAL had taken a position "unequivocally for private welfare" and against public interests and values in forestry. It is true that the JOURNAL has not published articles (since none were offered) similar in character to Major Ahern's "Deforested America." The professional Society and the JOURNAL have, however, devoted time and effort in huge amounts to discussing and devising practical means for dealing with this problem, be it increased public ownership, cooperation, or regulation, and has adopted a platform, republished in October, setting forth its stand. How in the face of the published records, such conclusions could be drawn I am not prepared to say.

H. H. CHAPMAN.

Editor, JOURNAL OF FORESTRY.

Dear Sir:

It is exceedingly unfortunate that so much of the valuable space of the JOURNAL should be given up to a controversy that the petitioners, demanding freedom of speech, insisted upon dragging out before the public instead of leaving it to the duly elected Council to consider and

settle, but it will have a salutary effect upon the rank and file of the profession.

Mr. Marshall "rushed up to the Forest Service Library" (doesn't the Indian Service's chief forester have a file in his own office?) and evidently with equal rush went through four years of editorials to prepare summaries. The summaries themselves, with some exceptions, are innocuous but the selection of quotations which, standing alone, do not give the full purport of the editorial, and the reading into some entirely erroneous intent is regarded among writers and critics as a reprehensible practise.

Does Mr. Marshall's paper have the approval of his eleven cosigners of the original petition? Do they condone this brand of ethics? Are they more interested in exhorting from the platform than in practising forestry in the woods? If so, I fear for forestry.

Evidently, anyone who seeks to serve forestry, without consistently making outcries against forest devastation, is a public enemy. I hold that forestry requires something much more solid than outcries. We have had outcries for 50 years and haven't gotten anywhere. In other words, the forester's past tactics of damnation have been the wrong tactics.

Mr. Marshall closes his article with what he thinks was the editor's attitude toward forestry.

An editorial should first of all be provocative. To make it provocative the editor does not necessarily have to express his own beliefs and views. An editorial without this feature is a waste of space. An editorial should also be of timely interest or value. Were the editorials of the past not timely and provocative? Editorials, furthermore, are not the sole expression of the editor's policy. The contributed articles themselves reflect it; the editorials merely supplement what the articles omit. I don't recall that the twelve signers contributed to the JOURNAL in the past four years outcries in their own way.

The whole controversy is a huge miscarriage of energy and effort. However it is going to do the profession a lot of good—and some of the petitioners a lot of harm. But a crusader is expected to be a patient, willing and suffering martyr.

EMANUEL FRITZ,
University of California.

HOW THE HARE SYSTEM WORKS

Many members of the Society have indicated to President Chapman, both at the section meetings which he attended and in connection with his article in the August JOURNAL, the desirability of having its workings described in an early issue of the JOURNAL. He has accordingly asked me to prepare an explanation of it using the results of the last election as illustrative material.

The Hare System of Proportional Representation (P. R. for short) is used by hundreds of thousands, perhaps millions of people, annually in various political and social elections throughout the English speaking world. Most of them take it on faith, or on the say so of leaders of thought in whom they have trust and who vouch for its fairness in obtaining equitable minority as well as majority representation for various like-minded groups of the electorate. In general, opposition to its use arises chiefly from two causes or sources. The politicians oppose it because they cannot rig it so as to control elections. Most of the others who oppose its use do so because they do not understand its workings, thinking it both complicated and obscure.

Such dissatisfaction with it as has arisen in the Society is most likely of the latter sort.

For the purposes of brevity no attempt will be made to discuss the philosophy of the system. That has already been covered in Chapman's article in the August JOURNAL above referred to as well as in previous contributions of mine.

For purposes of illustration the result sheets used in recording the ballot count of the Council 1933 and presidential elections have been somewhat modified. Thus the names of all the candidates except Chapman and Clapp have been eliminated and the letters A, B, C, and D substituted for the names of the four other successful candidates in the Council election with E and F representing the two others who came nearest to being elected. By a further modification the remaining fifteen candidates have been placed in three groups (five in each group), according to the order in which they were defeated, and the ballots for the candidates in each group shown on the simplified result sheet as though they had been cast for a single candidate. This consolidation greatly reduces the number of transfer operations, which otherwise would have to be made. As so simplified the ballot counting procedure should be readily understood. The result sheet for the Council election, simplified as just indicated, is shown in Table 1.

Ordinarily the candidates are listed on the result sheet alphabetically by name. For simplicity, however, the candidates in this case are listed in the order of magnitude of their first choice votes. Thus 209 voters indicated Chapman as the first choice on their respective ballots, 113 did similarly for Clapp and so on down to 29 for candidate F, while the five candidates comprising Group G received 103 ballots altogether, or an average of 20.6 each, the five in Group H received 93 altogether, or an average of 18.6 each and the five in Group I got 50 altogether, or an average of but 10 each, one candidate in this group receiving but three first choice ballots.

The outstanding features that differentiate P. R. from the usual election are two in number. First, each candidate elected receives a fixed number of ballots, called the quota. Second, each voter actually participates through his ballot in the election of but one candidate.

The quota is the smallest number of ballots that will elect the required number of members but no more. Six being the required number of members for our Council, the quota is found by dividing the total number of valid ballots, 916 in the 1933 election under consideration, by $6 + 1$ $(= 130\ 6/7)$ and rounding that result up to the next whole number, 131. Thus if six candidates each receive 131, the seventh cannot possibly receive more than 130 and so would fail of election. A valid ballot under the Hare rules must have the figure 1, denoting the voter's first choice, opposite the name of but one candidate.

The voter, although he actually participates in the election of only one candidate—his first choice whenever possible—marks his ballot to indicate his second, third and as many other choices as he feels competent to make. This is because his ballot may not continue to be credited to the candidate of his first choice, either because he has already received his quota and does not need it, or because he had already been defeated. In either of these events the ballot would be transferred to the next of the voter's choices who could use it.

Evidently the 209 first choice ballots placed to Chapman's credit (Column 1 of result sheet) exceeded the quota, 131, by 78. Accordingly, 78 ballots were transferred from him to the candidate indicated thereon as the individual voter's

TABLE 1

RESULT SHEET FOR COUNCIL ELECTION (SIMPLIFIED)

No. of Valid Ballots = 916 Number of Positions = 6 Quota $\left(\frac{\text{No. of ballots}}{\text{No. of positions} + 1}\right) = 131.$ $\frac{916}{6+1}$

No. and names of candidates	First choice	Trans. of suprlus ballots of Chapman	Res.	Trans. of ballots of group I	Res.	Trans. of ballots of group H	Res.	Trans. of ballots of group G	Res.	Trans. of ballots of F	Res.	Trans. of ballots of E	Final result
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
1—Chapman	209	—78	131		131	0	131	0	131		131		131
2—Clapp	113	7	120	9	129	2	131	0	131		131		131
3—A	83	4	87	1	88	7	95	25	120[1]	11	131		131
4—B	80	6	86	14	100	23	123	8	131[2]		131		131
5—C	65	11	76	1	77	5	82	49	131		131		131
6—D	51	7	58	7	65	10	75	32	107	20	127	4	131
7—E	40	3	43	4	47	24	71	23	94	15	109	—109	0
8—F	29	0	29	2	31	11	42	17	59	—59	0		0
9-13—G Group	103	26	129	10	139	26	165	—165	0		0		0
14-18—H Group	93	6	99	10	109	—109	0		0		0		0
19-23—I Group	50	8	58	—58	0		0		0		0		0
Ineffective			0			1	1	11	12	13	25	105	130
Total	916		916		916		916		916		916		916

second choice. The ballots to be transferred were selected at random, as is the more common practice in P. R. elections. It has been figured out, by the method of probability and chance, that such a random sample will give a fair distribution of second choices to the other candidates.

Of the 78 Chapman ballots so transferred, 11 went to candidate C as second choice, 7 each to Clapp and candidate D, 6 to B, 5 on the average to candidates in Group G, 4 to A, 3 to E, and so on with none to F. These second choice ballots were then added to the first choice ones with the results shown in column 3.

If Clapp and any of the other candidates had also received a surplus of votes above the quota these surpluses would have been likewise transferred in succession.

There having been no other surpluses in this case it became necessary to defeat the candidate having the smallest number of votes and transfer his ballots to his next choice. One candidate in Group I had only 3 first choice ballots to his credit so he was the first to be declared defeated. His ballots, accordingly, were transferred to candidates according to each voter's second choice. Following the same procedure of defeating the low man, the four other candidates in the same group having 11, 13, 14 and 17 ballots each respectively, 58 votes in all, were successively eliminated. The resulting distribution of these ballots is shown in column (4) with the new result shown in column (5).

In the original election, as above indicated, each candidate's ballots were transferred independently and the standing of the remaining candidates then determined. The candidate with the least ballots was then declared defeated and his ballots transferred.

The sixth candidate to be defeated (the lowest of the 5 in group H) had 19 ballots to his credit when declared defeated, the next lowest similarly had 21, the third 23, the fourth 24, and the fifth 25. Column 6 shows the way these 109 ballots (omitting 3 ballots that were transferred and tallied successively from one to another candidate within the group), were distributed among the remaining continuing candidates. Two ballots only,

TABLE 2

RESULT SHEET FOR ELECTION OF PRESIDENT

No. of valid ballots = 916 No. of positions = 1 Quota $\left(\frac{916+1}{1+1}\right)$ = 459

Number and names of candidates	First and other choice	Trans. of A's ballots	Result	Trans. of D's ballots	Result	Trans. of C's ballots	Result	Trans. of B's ballots	Final result
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1 Chapman	309	22	331	40	371	53	424	35	459
2 Clapp	164	9	173	30	302	22	225		225+
3 A	70	—70	0	0	0		0		0
4 B	121	13	134	25	159	42	201	—201	0
5 C	113	12	125	14	139	—139	0		0
6 D	112	10	122	—122	0		0		0
Ineffective	27	4	31	13	44	22	66		66+
Total	916		916		916		916		916

it will be noted, were credited to Clapp. These completed his quota and effected his election. One ballot, on the other hand, became ineffective.

The five Group G candidates were next declared defeated in succession thus releasing a total of 165 ballots. All but 11 of these, which became ineffective, were credited to the remaining 6 continuing candidates. From the first of the five candidates in this group to be declared defeated, Candidate B received the 8 ballots which he required to complete his quota. Candidate C, as a result of the ballots transferred to him from this group of defeated candidates, also accumulated the 49 additional ballots required to complete his quota, a surprising display of reserve strength.

It should be noted that both candidates B and C on the basis of first choice ballots had less than A. Each, nevertheless, proved to be a stronger candidate than A in the long run. Under the ordinary plurality system of voting, A would have unquestionably been accorded the greater strength. The situation proved to be otherwise, however, when the 246 voters who at the outset had given their support to the weaker candidates (comprising Groups G, H, and I), were released therefrom and given a chance to make their support ultimately effective in a discriminating choice from among the six continuing candidates who were then real contenders.

The result at this point is an especially effective demonstration of the superiority of P. R. over the ordinary method of voting as a means of giving full expression of choice to each and every voter and thereby enabling the stronger candidates to prove their real strength.

With four candidates elected and four candidates contending for the two remaining positions, candidate F at this juncture had to his credit the smallest number of ballots. His resulting defeat gave candidate A the required 11 ballots to complete his quota and elect him. It also advanced candidate D to within four votes of completing his quota whereas candidate E lacked 22 votes of a quota. Thereupon D, as the leading candidate of the two, was declared elected to the sixth and final place on the Council since the defeat of E and the distribution of his 109 ballots would certainly have given D the required four ballots to complete his quota.

There being but one position to fill by direct election, namely, president, the quota for this portion of the election is $\frac{916}{1+1} = 458 + 1 = 459$. Thus, if one candidate gets a full quota of 459 the runner up cannot possibly get more than 457. As a matter of fact, the contest will rarely if ever come out that close, because of the many ballots which become ineffective through the failure of voters fully to express their choices.

The first column in the presidential tally is not at all comparable with that on the result sheet for Council. There are two reasons for this. The voters were given an opportunity to express their first choice for president independent of that for members of the Council and many did so. Then the first and other choice ballots marked for all those 18 candidates who failed of election to the Council and were, therefore, out of the running for this part of the election, were also added to the first choice ballots of the 6 continuing candidates, thus altering the alignment still more. Perhaps the most noticeable change in line up, aside from the way Chapman opened up his lead, was the falling behind of Candidate A who was third at the beginning of the council ballot count (though falling back to fifth place on the order of election) and who dropped back to sixth place at the beginning of

the presidential count. Candidates B, C, and D, on the other hand, held their same relative positions, although D made the greatest gain over his council first choice total. Here again is additional evidence of how relatively weak a candidate A was. His initial strength in the Council election came chiefly from his own Section which desired representation on the Council and got it. Many of the Section members, however, gave their first choice to other candidates for president.

Candidate A as the low man was first to be defeated. The distribution of his 70 ballots was most favorable to Chapman and not as favorable to D as to B and C. So D was the second to be defeated. The distribution of his 122 supporting ballots was again most favorable to Chapman and Clapp and least so to C who was the third to be defeated. Chapman again benefited most from this and although Clapp's gains were materially less than B's on this transfer his lead over B was too great to be overcome. So B went down to defeat. This gave Chapman the 35 votes which he needed to complete his quota and effect his election as President, leaving Clapp as the runner-up and Vice-President.

LOUIS S. MURPHY.

COMMENTS

The outstanding merit of the Hare System is that no ballot is wasted in giving a candidate already assured of election more votes than he needs. By the indication of second, third, etc., choices, the voter's desire counts for one of these alternate candidates after his first choice is elected by other voters. No candidate need be voted for who does not meet the approval of the voter. Any ballot is valid if no more than one candidate is indicated. In such case the voter simply limits the possibility of having his vote count for someone else whom he would like to see elected.

It is because of the *effective distribution* and full weight given to every vote that the Hare System tends to secure the widest possible diffusion of ballots consistent with the principle of true numerical representation. The effort to secure the advantages of such preferential balloting is the reason for favoring three or not over four large voting districts, which by electing up to four members of the Council would, while fully retaining this numerical basis of representation, yet give to sections and groups their greatest opportunity to secure the election of their candidate if supported by alternate choices of other voters.

H. H. CHAPMAN.

JOURNAL TO BE ISSUED MONTHLY

Effective January, 1935, the JOURNAL OF FORESTRY will be published monthly, 12 times a year, instead of 8, as in the past. Each issue will number about 96 pages. There will be no change in subscription or advertising rates at the present time.

Plans for the Annual Meeting

Date—January 28, 29, 30, 1935

Place—Shoreham Hotel, Washington, D. C.

COMMITTEE ON ARRANGEMENTS AND PROGRAM

H. H. Chapman, C. M. Granger, G. H. Collingwood, Franklin Reed

WOMEN'S COMMITTEE

A committee composed of wives of resident members will be on hand to provide for the comfort and pleasure of visiting members' wives

Program

Tentative, subject to changes and additions of which notice will be given later

JANUARY 28—MORNING SESSION

9:30 A. M.—Opening Preliminaries, President Chapman Presiding
10:00 A. M.—"The Social Aspects of Forestry" or "Forestry and the New Deal"

Chairman ————
Principal Speaker: F. A. Silcox
Discussion Leader: ————
General Discussion

AFTERNOON SESSION

2:00 P. M.—"Progress under Article X of the Lumber Code"

Chairman ————
Principal Speakers: D. T. Mason and John B. Woods
Discussion Leader: ————
General Discussion

EVENING SESSION

Meeting of the Educational Division
(Details in hands of officers of the Division)

JANUARY 29—MORNING SESSION

9:00 A. M.—"Society Affairs"
Chairman: President Chapman

Reports of President, Secretary-Treasurer, Editor-in-Chief, etc., as required by the Constitution. Submission and discussion of several Project Committee Reports
(See p. 797, October, 1934, Journal)

AFTERNOON SESSION

2:00 P. M.—"Society Affairs" (continued)

Chairman: President Chapman

"An Editorial Policy for the JOURNAL OF FORESTRY." This promises to be a live topic. Discussion of it and of related questions concerning Society policy as a whole should productively consume the whole afternoon

7:30 P. M.—Annual Banquet

Master of Ceremonies: S. N. Spring

Formal presentation to President Roosevelt (if he finds it possible to attend) of Honorary Membership and of the "Schlich Memorial Award"

10:30 P. M.—Adjournment for dancing, cards, or other recreation

JANUARY 30—MORNING SESSION

9:00 A. M.—"State Forestry—Need and Ways and Means for Strengthening It"

Chairman ————————

Principal Speaker: Robert M. Ross

Discussion Leader: ————————

General Discussion

AFTERNOON SESSION

2:00 P. M.—"Fire and Its Relation to Silviculture in the Southern Pine Region"

Chairman ————————

Principal Speaker: E. L. Demmon

Discussion Leader ————————

General Discussion

5:00 P. M. Adjournment

PERSONALS

Thomas W. Skuce, formerly extension forester of West Virginia, is now state project manager of West Virginia, with the Land Policy Section, Division of Program Planning of the Agricultural Adjustment Administration.

Dean Samuel N. Spring, Professors Nelson C. Brown, Edward F. McCarthy and Dr. Joseph S. Illick, of the New York State College of Forestry, were recently appointed to serve on the forestry committee of the New York State Planning Board.

R. B. Goodman, Marinette, Wisconsin, received the degree of LL.D. at the University of Wisconsin. Mr. Goodman is chariman of the Wisconsin Conservation Commission and was recently elected an associate member of the Society of American Foresters.

R. T. Titus has been appointed by the Board of Directors of the Intercoastal Lumber Distributors Association to succeed L. B. Anderson as Executive Officer of that organization. The Intercoastal Lumber Distributors Association is the administrative agency for the Lumber Code Authority for the Intercoastal Subdivision, having under its jurisdiction all shippers of West Coast lumber products to the Atlantic Coast by water including both manufacturers and wholesalers.

SECTION NEWS

Allegheny-New York Joint Summer Meeting

The thirteenth annual summer field meeting of the Allegheny Section will go down in the annals of the Section as one of the most successful meetings held despite the efforts of the weather man to dampen the party. With the Allegheny Section acting as host to the New York Section, some 144 members of both Sections with their guests, which included 27 of the fair sex, met at Rock View House, Montague, N. J., September 6.

The afternoon of the first day was spent at Milford, Pa., visiting the country estate of the Hon. Gifford Pinchot, Pennsylvania's forester governor. Thursday evening was devoted to smoking, dancing, and a general social get-to-gether.

On Friday the party, aboard several large motor busses, was transported to many interesting forestry operations in northern New Jersey. The Stokes State Forest was first visited with Supervisor L. D. Dunn as the guide. Roads, built with E. C. W. labor, were inspected and much roadside thinning and clearing could be seen from the busses. Leaving the Stokes Forest the party was guided to Netcong where an excellent example of sustained yield forestry was viewed on property of the New Jersey Zinc Company. Near Denville a typical example of some of the work of the State Emergency Relief Administration on private woodland was pointed out by Assistant Forester E. B. Moore in charge of this work. Both before and after lunch at the Newfoundland Church, the party were guests of the City of Newark and inspected much of the 40,000 acres of managed woodlands on the Pequannock Watershed. Guided by Forester J. M. Heilman many interesting plantations, woodland improvement cuttings, and thinnings were visited. On another property of the New Jersey Zinc Company a very interesting southern white cedar swamp was visited. The final stop of the day was made at High Point Park the highest point in New Jersey and a gift to the state by Colonel and Mrs. A. R. Kuser.

Friday evening was devoted to a banquet, held in the Casino of the Rock View House which was suitably decorated for the occasion. Music by Jack Lynch's Pennsylvanians with dancing between courses enlivened the party. Chairman J. M. Sloan of the Allegheny Section as Toastmaster called on the following who responded with short talks: H. P. Brown, Chairman of the New York Section, F. W. Besley, R. S. Hosmer, S. S. Hunt, Clyde Leavitt, C. P. Wilber, J. S. Illick, P. A. Herbert, G. H. Wirt, J. A. Ferguson, W. S. Taber, R. D. Forbes, J. W. Keller, W. H. Rankin, G. T. Backus, W. H. Harlow, A. C. McIntyre and H. F. Round.

The trip Saturday morning was well attended despite a steady rain which kept up all day. The trip was entirely in Pennsylvania and in charge of District Forester E. C. Pyle. Stops were made at the Child State Park where many braved pneumonia to view the beautiful waterfalls. New E. C. W. roads were traversed to arrive at the Blooming Grove Hunting and Fishing Club where a stop was made to view the wonderful collection of mounted heads, birds and fish. A stop was also made at the club's fish hatchery. A complete circuit was made of Promised Land Lake owned by the State Depart-

ment of Forests and Waters which is being developed by E. C. W. labor. The next stop was made for lunch at the fashionably famous Skytop Club high in the Poconos. Due to the downpour of rain the balance of the trip to the huckleberry barrens of the Pocono Plateau was abandoned, and the trip broke up after lunch.

Arrangements for the meeting were in charge of the joint committee which included W. J. Quick, J. E. Mausteller, H. E. Clepper, J. M. Sloan, A. C. McIntyre, H. F. Round and E. A. Ziegler of the Allegheny Section and E. W. Littlefield, J. S. Davis, S. Heiberg, H. P. Brown and W. L. Harlow of the New York Sections.

New England

SUMMER MEETING

The annual summer meeting of the New England Section was held at Rangeley Lakes, Maine, on Monday and Tuesday, September 3 and 4, with headquarters at the Mooselookmeguntic House, Haines Landing. The field trips, which were under the general direction of Mr. H. B. Peirson and members of the Maine Forest Service and the Brown Company, took in a variety of work being done by C.C.C. camps, inspection of the Brown Company Nursery and Fire Warden's headquarters at Oquossoc, experimental plots covering various phases of forest management, a trip to see a spruce bark beetle outbreak and stands of birch, Norway pine, poplar and spruce. At lunch on Tuesday at the Eustis Cathedral Pines interesting talks on the history of the section were given by Messrs. Berry, Packard and Rothery. Superintendent Dickson of the Flagstaff C.C.C. camp, told what was being done at his camp. On Tuesday evening Mr. George J. Stobie, Commissioner of Inland Fisheries and Game, showed several reels of motion pictures of fish and game and gave an instructive lecture.

At the business meeting, Monday evening, matters of importance were considered. The chairman asked that a committee on Article 10 of the Lumber Code be authorized to take the place of the one discharged at the winter meeting; this was approved as was also a committee to report suggestions for the improvement of the C.C.C. Mr. Barraclough read a letter from Mr. A. B. Recknagel on the present status of the lumber code as it affects the northeastern region. Mr. H. H. Chapman made a few remarks concerning the petition circulated early in the summer and subsequently published in the October JOURNAL. The editorial policy of the JOURNAL was discussed at length and a motion was passed, by a vote of 25 to 20, that the New England Section gathered at the summer meeting recommend to the Executive Council that they consider the discontinuing of the editorial page of the JOURNAL.

Resolutions concerning the Dutch Elm Disease, Gipsy Moth and Blister Rust Control were approved and ordered sent to where they would do the most good. A resolution thanking Mr. Peirson and his associates for the excellent arrangements for the meeting was unanimously passed. The place for the winter meeting was left to the discretion of the Section Executive Council.

Announcement of Candidates for Membership

The following names of candidates for membership are referred to Junior Members, Senior Members and Fellows for comment or protest. The list includes all nominations received since the publication of the list in the October Journal, without question as to eligibility. The names have not been passed upon by the Council. Important information regarding the qualifications of any candidate, which will enable the Council to take final action with a knowledge of essential facts, should be submitted to the undersigned before December 10, 1934. Statements on different men should be submitted on different sheets. Communications relating to candidates are considered by the Council as strictly confidential.

FOR ELECTION TO GRADE OF JUNIOR MEMBERSHIP

Name and Education	*Title and Address*	*Proposed by Section*
Bascom, S. G. N. Y. State Ranger School, 1929.	Camp Supt., CCC Camp No. 96-S, Sempronius, New York.	New York
Bonney, Maurice Oregon State, B.S.F., 1929.	Junior Forester, Ozark N. F., Russellville, Arkansas.	Ozark
Brillhart, John H. Pa. State, B.S.F., 1934.	Timber Estimator, U. S. Soil Erosion Service, High Point, N. C.	Appalachian
Burton, Leroy A. Univ. of Maine, B.S.F., 1933.	Cultural Foreman, Nantahala Forest, Clayton, Ga.	Southeastern
Chesson, Maxwell La. State, B.S.F., 1930.	Technical Foreman, U.S.F.S., Catahoula Nursery, Pollock, La.	Gulf States
Cole, John Fry Univ. of Ga., B.S.F., 1932.	Ass't to Technician, U.S.F.S., Erwin, Tenn.	Appalachian
Cranston, Wm. V. Univ. of Idaho, B.S.F., 1933.	Junior Technician, Ouachita N.F., Hot Springs, Ark.	Ozark
Creighton, G. W. I. Univ. of New Brunswick, B.S.F., 1929; Eberswalde and Tharandt, Germany.	Provincial Forester, Halifax, N. S. Can.	New England
Duffield, John W. Cornell, B.S.F., 1934.	Graduate Student, Harvard Forest, Petersham, Mass.	New England
Dyksterhuis, E. J. Iowa State, B.S.F., 1932.	Jr. Range Examiner, Lincoln N.F., Capitan, New Mex.	Southwestern
Earl, Dean M. Utah State, B.S.F., 1932.	Junior Forester, Grazing Survey, Alamogordo, New Mex.	Southwestern
Elliott, Chas. N. Univ. of Ga. (ex '28).	District Forester, Ga. Forest Service, Augusta, Ga.	Southeastern
Ellis, Godfrey D. Univ. of New Brunswick, B.S.F., 1932.	Acting Forester, Bathurst Power & Paper Co., Ltd., Bathurst, N. B.	New England
Fassett, Perry J. Mich. State, B.S.F., 1932.	Technical Foreman, E.C.W., Marquette N.F., Raco, Mich.	Wisconsin
Fitzgerald, Russel C. Grace School; Business Education; Forest Service Study Courses.	Principal Forest Ranger, Bitterroot N.F., Hamilton, Mont.	Northern Rocky Mt.
Griffith, George E. High School.	Ass't in Office of Public Relations, U.S.F.S., Portland, Orgon.	North Pacific
Hawley, Norman R. Oregon State, B.S.F., 1929.	Junior Forester (Timber Survey), Ouachita N.F., Hot Springs, Ark.	Ozark
Hayes, G. Lloyd Univ. of Idaho, B.S.F., 1934.	Ass't Technician, Northern Rocky Mountain Forest and Range Exp. Sta., Missoula, Mont.	Northern Rocky Mt.
Herion, George A. Univ. of Minn., B.S.F., 1934.	Forester, Camp P.E. 61, Gilmanton, Wis.	Minnesota
Hochmuth, Harold R. Colo. State, B.S.F., 1934.	Asst. to Technician, Blister Rust Control, Denver, Colo.	Northern Rocky Mt.
Jacobsen, Henry R. N. Y. State, B.S.F., 1925.	Watershed and Timber Appraiser, H. L. Gray, Consulting Engineer, Seattle, Wash.	North Pacific

Name and Education	*Title and Address*	*Proposed by Section*
Kearns, Richard S. Oregon State, B.S.F., 1930, M.S. F., 1931.	N.R.A., Technician, Pacific Northwest For. Exp. Sta., Portland, Ore.	North Pacific
Kerst, John J. N. C. State B.S.F., 1932.	Estimator, DeSoto National Forest, Brookhaven, Miss.	Gulf States
Kimmey, J. W. Oregon State, B.S.F., 1931, M.S.F., 1932.	Forest Pathologist, Bureau Plant Industry, Portland, Oregon.	North Pacific
Kraemer, J. Hugo Univ. of Idaho, B.S.F., 1934; Harvard, M.F. (to be received), 1935.	Ass't to Technician, U.S.F.S., White Mountain N.F., Laconia, N. H.	New England
Larson, Stanford H. Univ. of Mont., B.S.F., 1932.	Technician, Forest Survey, U.S.F.S., Missoula, Mont.	Northern Rocky Mt.
Maxwell, Albert H. N. C. State, B.S.F., 1932.	Junior Forester, Pisgah N.F., Old Fort, N. C.	Appalachian
Meginnis, H. G. Iowa State, B.S.F., 1928; M.F., 1929.	Silviculturist, Southern For. Exp. Sta., New Orleans, La.	Gulf States
Morrill, George E. Univ. of Wash., B.S.F., 1932; M.S.F., 1933.	Junior Forester, Southern Forest Exp. Sta., Lake City, Florida.	Southeastern
Neitzling, Fred J. One term Ranger Short Course, Univ. of Mont.	Ass't Supervisor, Bitterroot N.F., Hamilton, Mont.	Northern Rocky Mt.
Olson, Clarence E. Univ. of Minn. B.S.F., 1931; M.S.F., 1933.	Superintendent, CCC Camp F-17-N, Capitan, N. Mex.	Southwestern
Penick, Norman J. Univ. of Wash., B.S.F., 1931; N. Y. State, M.S., 1932.	Junior Forester, U.S.F.S. (ECW), Portland, Oregon.	North Pacific
Puphal, Irwin C. Univ. of Minn., B.S.F., 1930.	N.R.A. Technician, Northern Rocky Mountain Forest and Ranger Exp. Sta., Missoula, Mont.	Northern Rocky Mt.
Sawyer, George Cushing Dartmouth College, 1932; Yale, MF., 1934.	Patrolman, Maine Forest Service, Ashland, Maine.	New England
Shanklin, John F. N. Y. State, B.S.F., 1924.	Assoc. Forester, Natl. Park Service, Washington, D. C.	Washington
Shetter, William Lewis Univ. of Mich., B.S.F., 1930.	Ranger, U.S.F.S., Meadville, Miss.	Gulf States
Smith, Archer D., Jr. Pa. State, B.S.F., 1934.	Estimator, U.S.F.S., Witherbee, S. C.	Appalachian
Stuart, Alice Univ. of Minn., B.S.F., 1933.	Branch of Research, U.S.F.S., Washington, D. C.	Minnesota
Turberville, Herbert W. Pa. State, B.S.F., 1934.	Ass't, Forestry Dept., Pa. State College, Pa.	Allegheny
Willison, Charles Herbert, Jr. Oregon State B.S.F. 1933; Yale, M.F., 1934.	Estimator, White Mt. N.F., Laconia, N. H.	New England
Woolfolk, Edwin Joseph Univ. of Mont., B.S.F., 1932.	Junior Range Examiner, Northern Rocky Mountain Forest and Ranger Exp. Sta., Missoula, Mont.	Northern Rocky Mt.
Worthington, Robert Edgar Univ. of Wash., B.S.F., 1923; M.F., 1932; Grad. Yale, 1932-34 (thesis not completed).	Ass't Conservationist, Southern Forest Experiment Sta., New Orleans, La.	Gulf States

FOR ELECTION TO GRADE OF SENIOR MEMBERSHIP

Name and Education	*Title and Address*	*Proposed by Section*
Mowat, Edwin L. Oregon State, B.S.F., 1924 (Junior Member, 1925).	Junior Forester, Intermountain Forest and Range Exp. Sta., Ogden, Utah.	Intermountain
Ochsner, Herbert Edward Univ. of Mich., B.S.F., 1926; M.S.F., 1927.	Ass't Supervisor, Pisgah National Forest, Asheville, N. C.	Appalachian

C. F. KORSTIAN,
Member of Council in Charge of Admissions.

SOCIETY COMMITTEES

As recently reorganized by the President and Council.

FOREST HISTORY

Paul G. Redington

PUBLIC FOREST POLICY

Ralph Hosmer, *Chairman*
H. L. Baker
Geo. Cecil
Robert Marshall
W. B. Greeley
Paul Herbert
J. P. Kinney
C. F. Evans

INTERNATIONAL RELATIONS

Ralph Hosmer, *Chairman*
N. C. Brown
R. S. Kellogg
E. N. Munns
A. C. Ringland
J. P. Kinney
R. C. Bryant
J. D. Guthrie
G. S. Perry
Barrington Moore
Ward Shepard
W. N. Sparhawk

PROFESSIONAL ETHICS

John D. Guthrie

REVISION OF CONSTITUTION

H. H. Chapman, *Chairman*
S. N. Spring
E. L. Demmon
E. Fritz
F. W. Besley

CLASSIFICATION OF FOREST SCHOOLS

H. H. Chapman, *Chairman*
C. F. Korstian
H. A. Winkenwerder
E. Fritz
S. N. Spring

FINANCE

H. H. Chapman, *Chairman*
W. N. Sparhawk
C. M. Granger

FOREST FIRE CONTROL

G. H. Collingwood, *Chairman*
H. A. Reynolds
G. Conzet
E. I. Kotok
C. S. Chapman
Fred Morrell
H. L. Baker

COOPERATION TO IMPROVE EXPLOITATION PRACTICES IN SOUTH

A. L. Wackerman
C. Kuehn
C. B. Webster
L. Wyman
G. D. Marckworth

METHODS OF ELECTION

H. H. Chapman, *Chairman*
H. F. Round
D. S. Olson
T. T. Munger
W. M. Baker

GAME MANAGEMENT WITH REFERENCE TO FORESTRY

Aldo Leopold, *Chairman*
P. S. Lovejoy
C. E. Rachford
W. P. Taylor
R. T. King

FOREST INFLUENCES AND EROSION CONTROL

W. C. Lowdermilk, *Chairman*
C. L. Forsling
J. Kittredge
C. J. Kraebel
Dr. C. R. Hursh
C. G. Bates
E. N. Munns
G. H. Lentz
G. R. Phillips
Lyle Watts

ORGANIZATION OF STATE FORESTRY DEPARTMENTS

R. M. Ross, *Chairman*
Dr. Henry Schmitz
A. B. Hastings
F. W. Besley
C. A. Gillett

PUBLIC CONTROL OF FOREST EXPLOITATION

H. S. Graves, *Chairman*
Shirley W. Allen
Swift Berry
S. J. Hall
W. L. Hall
S. B. Locke
C. K. McHarg
W. N. Sparhawk
J. B. Woods

SOCIETY OFFICERS

Officers and Members of Council

President, H. H. CHAPMAN, Yale School of Forestry, New Haven, Conn.
Vice-President, EARLE H. CLAPP, U. S. Forest Service, Washington, D. C.
Secretary-Treasurer, C. M. GRANGER, U. S. Forest Service, Washington, D. C.

Council

The Council consists of the above officers and the following members:

	Term expires		Term expires
F. W. BESLEY	Dec. 31, 1937	E. L. DEMMON	Dec. 31, 1935
EMANUEL FRITZ	Dec. 31, 1937	A. F. HAWES	Dec. 31, 1935
WARD SHEPARD	Dec. 31, 1937	C. F. KORSTIAN	Dec. 31, 1935
S. N. SPRING	Dec. 31, 1937	HUGO WINKENWERDER	Dec. 31, 1935

Member in Charge of Admissions

C. F. KORSTIAN

Executive Offices

810 Hill Bldg., Washington, D. C.
FRANKLIN W. REED, *Executive Secretary*

Section Officers

Allegheny

J. M. Sloan, Chairman, Anthracite Forest Prot. Assoc., 514 Hazleton Natl. Bank Bldg., Hazleton, Pa.
A. C. McIntyre, Vice-Chairman, Dept. of Forestry, State College, Pa.
H. F. Round, Secretary, Forester's Office, Pa. R. R. Co., Philadelphia, Pa.

Appalachian

W. J. Damtoft, Chairman, Champion Fibre Co., Canton, N. C.
William Maughan, Vice-Chairman, Duke University, Durham, N. C.
I. H. Sims, Secretary, 223 Federal Bldg., Asheville, N. C.

California

George H. Cecil, Chairman, Chamber of Commerce, Los Angeles, Calif.
Jay H. Price, Vice-Chairman, U. S. Forest Service, San Francisco, Calif.
Russell Beeson, Secretary, U. S. Forest Service, San Francisco, Calif.

Central Rocky Mountain

W. J. Morrill, Chairman, 617 Remington St., Ft. Collins, Colo.
Wm. R. Kreutzer, Vice-Chairman, Box 567, U. S. Forest Service, Ft. Collins, Colo.
Lynn H. Douglas, Vice-Chairman, (Denver) U. S. Forest Service, Denver, Colo.
C. L. Van Giesen, Secretary-Treasurer, U. S. Forest Service, Halsey, Neb.

Gulf States

H. E. Wackerman, Chairman, Southern Pine Assoc., New Orleans, La.
D. E. Lauderbun, vice-Chairman, 303 Old Merchants Bank Bldg., Jackson, Miss.
R. K. Winters, Secretary, Southern Forest Exp. Sta., New Orleans, La.

Intermountain

Dana Parkinson, Chairman, U. S. Forest Service, Ogden, Utah.
Charles N. Genaux, Univ. of Idaho, Southern Branch, Pocatello, Idaho.
H. N. Shank, Secretary, U. S. Forest Service, Ogden, Utah.

Minnesota

L. W. Rees, Chairman, Div. of Forestry, University Farm, St. Paul, Minn.
S. R. Gevorkiantz, Secretary-Treasurer, Lake States Forest Exp. Sta., Univ. Farm, St. Paul, Minn.

New England

R. M. Ross, Chairman, 3683 Whitney Ave., Mt. Carmel, Conn.
H. J. MacAloney, Secretary, Northeastern Forest Exp. Sta., 335 Prospect St., New Haven, Conn.

New York

H. P. Brown, Chairman, N. Y. State College of Forestry, Syracuse, N. Y.
W. M. Harlow, Secretary, N. Y. State College of Forestry, Syracuse, N. Y.

Northern Rocky Mountain

Theodore Shoemaker, Chairman, U. S. Forest Service, Missoula, Mont.
C. D. Simpson, Vice-Chairman, U. S. Forest Service, Coeur d'Alene, Idaho.
Harry Ade, Secretary, U. S. Forest Service, Missoula, Mont.

North Pacific

T. T. Munger, Chairman, Pacific N. W. Forest Exp. Sta., U. S. Court House, Portland, Ore.
J. F. Kummel, Secretary, U. S. Forest Service, Portland, Ore.
D. N. Matthews, Treasurer, 2737 N. E. 9th Ave., Portland, Ore.
Vice-Chairman, Oregon: B. E. Hoffman, 1075 Carlton Avenue, Portland, Ore.
Vice-Chairman, Washington: D. S. Jeffers, College of Forestry, Univ. of Washington, Seattle, Wash.
Vice-Chairman, British Columbia: P. Z. Caverhill, Chief Forester, Victoria, B. C., Canada.
Vice-Chairman, Hawaii: C. S. Judd, 1828 Vancouver Highway, Honolulu, Hawaii.
Vice-Chairman, Alaska: Wellman Holbrook, U. S. Forest Service, Juneau, Alaska.

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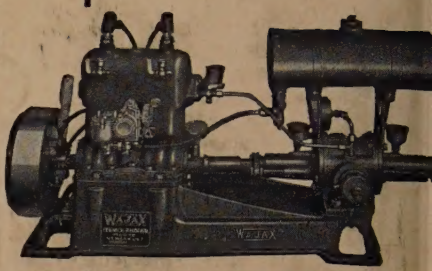

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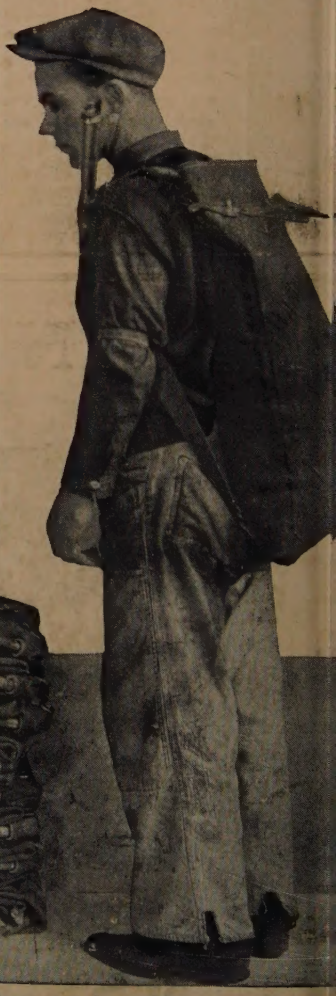

The above shipment of 50 RANGER SPECIAL Water Bags, complete with Hand Pumps, occupies the following space: 54" wide, 27" high, 22" deep.